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SUMMARY OF AEROLOGICAL OBSERVATIONS OBTAINED BY MEANS OF KITES, AIRPLANES AND SOUNDING BALLOONS IN THE UNITED STATES

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By Charles M. Lennahan
[Weather Bureau, Washington, D. C.]

INTRODUCTION

This publication is largely a compilation of data based on all of the free-air temperature, pressure, and humidity observations made in the United States which were available to the Weather Bureau and which could be included under the adopted plan of presentation. The primary reason which led to this compilation was the urgent request on the part of the aeronautical industry and others for data representative of average and extreme meteorological conditions in the upper troposphere and substratosphere. The plan of presentation of the data was, therefore, dictated to a large extent by the desire to fulfill the immediate needs of the aviation industry in planning for high-

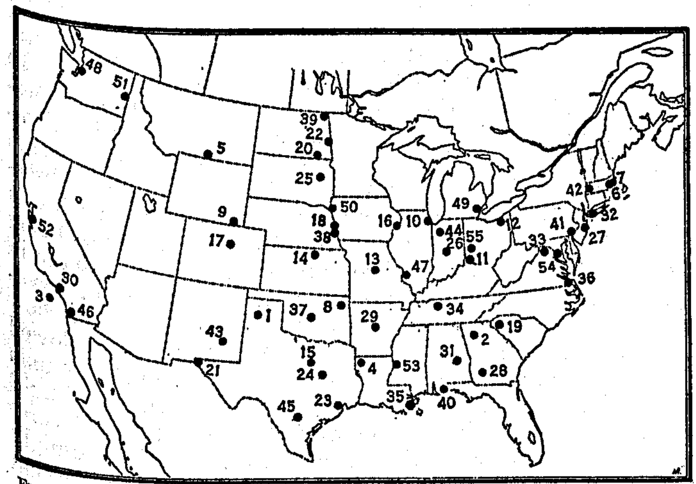

Figure 1.—Geographical locations of the 55 stations where the observations were made. Numbers correspond to those given in table 1.

altitude flying and at the same time to fulfill the needs of meteorologists, so far as practicable, with the limited material at hand.

The stations where the observations used in this summary were made are given in table 1. Their geographical location is shown in figure 1. The types of observations made at the different stations are also indicated in the table, together with the dates of the periods during which the soundings were made. The airplane flights were made practically every day at the same time, but the kite flights were often delayed until late in the day, and frequently it was impossible to get a sounding because of light wind or unfavorable weather. The sounding-balloon observations were made at periods designated in advance, except in those instances when a particular type of meteorological situation was being investigated. In the latter case the observers had to bide their time and wait for the desired condition.

The data published herein include four primary elements—temperature, pressure, humidity, and density. Two secondary elements are also included—extreme temperature and minimum pressure.

The observations were made at 55 different places, distributed over the entire country, but 43 of them are east of 100° W. longitude. Sounding-balloon observations were made at 29 different stations and numbered in all somewhat over 550. The kite and airplane observations are very numerous, the former having been made at 9

Table 1.—*Stations at which aerological observations were made*

No.	Station	Number of years of record	Period	Type of observations
1	Amarillo, Tex.[2]			B [3]
2	Atlanta, Ga	1	1932–33	A
3	Avalon, Calif		Summer 1913	B
4	Barksdale Field, La. (Shreveport)	1	1935–36	A
5	Billings, Mont	2	1934–36	A
6	Blue Hill, Milton, Mass	10	1894–1903	K
7	Boston, Mass	4	1932–36	A
8	Broken Arrow, Okla	12½	1919–31	BK
9	Cheyenne, Wyo	2	1934–36	A
10	Chicago, Ill	2	1931–33	A
11	Cincinnati, Ohio[2]			B
12	Cleveland, Ohio	3	1931–34	A
13	Columbia, Mo.[1]			B
14	Concordia, Kans.[2]			B
15	Dallas, Tex.[1]	3	1931–34	BA
16	Davenport, Iowa[2]			B
17	Denver, Colo.[1] [2]			B
18	Drexel, Nebr	11	1915–26	K
19	Due West, S. C	11	1921–32	K
20	Ellendale, N. Dak	14½	1918–33	BK
21	El Paso, Tex	1	1935–36	A
22	Fargo, N. Dak	1½	1934–36	A
23	Galveston, Tex	½	1934	A
24	Groesbeck, Tex	12½	1918–31	BK
25	Huron, S. Dak		Summer, autumn 1910.	B
26	Indianapolis, Ind		Autumn 1909	B
27	Lakehurst, N. J	2	1934–36	A
28	Leesburg, Ga	1½	1919–20	K
29	Little Rock, Ark.[1] [2]			B
30	Los Angeles, Calif.[1]			B
31	Maxwell Field, Ala. (Montgomery)[1]	2	1934–36	BA
32	Mitchell Field, N. Y. (New York)	1½	1934–35	A
33	Mt. Weather, Va	5	1907–11	K
34	Murfreesboro, Tenn.[1] [2] (Nashville)	1½	1934–35	BA
35	New Orleans, La.[1]			B
36	Norfolk, Va	6½	1929–35	A
37	Oklahoma City, Okla.[1]	1½	1934–35	BA
38	Omaha, Nebr	4½	1931–35	BA
39	Pembina, N. Dak	1	1933–34	BA
40	Pensacola, Fla	8	1928–35	A
41	Philadelphia, Pa	½	1934–35	A
42	Pittsfield, Mass		Spring, summer 1908.	B
43	Roswell, N. Mex.[1]			B
44	Royal Center, Ind	12½	1918–31	BK
45	San Antonio, Tex.[1]	1½	1934–35	A
46	San Diego, Calif	7	1919–35	A
47	Scott Field, Ill. (St. Louis)[2]	1½	1934–35	BA
48	Seattle, Wash	5	1930–35	A
49	Selfridge Field, Mich. (Detroit)	1½	1934–35	A
50	Sioux City, Iowa[2]			B
51	Spokane, Wash	1½	1934–35	A
52	Sunnyvale, Calif	3½	1932–35	A
53	Vicksburg, Miss.[1] [2]			B
54	Washington, D. C	10½	1925–35	A
55	Wright Field, Ohio (Dayton)	1½	1934–35	A

[1] December 1927 and February 1928.
[2] December 1929 and January 1930.
[3] B = balloon sounding, K = kite observation, A = airplane observation.

stations and the latter at 30 others. However, Leesburg, Ga., and Blue Hill Observatory, Milton, Mass., have made but a comparatively small number of kite flights, and some stations have a record of airplane observations extending over only 1 year. The kite and airplane stations are mutually exclusive, but the sounding-balloon stations include some stations of the kite and airplane groups. Sounding balloons were sent up at four of the kite stations and at eight of the airplane group. Also, a few limited-height sounding-balloon ascensions were made at the kite stations in place of the regular kite flights.

At several stations where there were but few data these were combined with the more numerous data of a nearby station. Thus the data obtained at Fort Worth, Montgomery, Nashville, and St. Louis were combined with the data for Dallas, Maxwell Field, Murfreesboro, and Scott Field, respectively. It is to be noted that Drexel and Omaha are published separately. This was done because of the relatively long period of observation at each station and the different periods of observation.

Thirteen stations have records with observations during at least one season, extending over a period of 5 years. Seven of these are kite stations and six of them are airplane stations. Of the other 26 airplane and kite stations 20 have only 2 years or less of record. A few in the airplane group have a record of less than 1 year. The 16 stations having only sounding-balloon records have observations ranging in number from 1 to 16. Most of the latter are of interest as individual observations rather than as aggregations yielding representative means.

The temperature data are presented in the form of seasonal mean curves, in seasonal longitudinal cross-sections, in tabular form, and for the region up to 5 km on standard level maps.

The pressure and humidity data are shown by means of seasonal mean curves, in tabular form, and for the first 5 kilometers in the form of standard level maps.

The density values are presented in the form of curves and tables for only the seven stations in the central part of the country. Density is not further considered.

The temperature extremes are shown for the seven central stations on the same graph with the seasonal mean-temperature curves. For the other stations they are shown in tabular form only. In the tables the extremes are listed among the temperature data for the winter season, with six exceptions; five of these are with the summer data and one is with the autumn data.

The minimum pressures are shown by means of two curves, each with different assumed surface conditions and an assumed lapse-rate.

The observations were not made at corresponding periods at all stations. Some of the soundings were made in the early days of aerology: Blue Hill in 1903–6, Mount Weather 1907–12, and others during various periods throughout the subsequent 25 years. Practically all of the available observations were used but in those cases where two or more soundings were made on the same calendar day only one observation was used. For this reason only about 75 percent of the Polar-Year observations, August 1932–August 1933, were used. The fact that the times and places of the observations are at such variance tends to vitiate the results of any attempt to combine them into a homogeneous whole. For seven stations in the central part of the United States during all four seasons the number of observations is sufficient to give fair mean values up to 15 km. With regard to the other stations having sounding-balloon records, the observations are too few to give a mean value that can be considered truly representative. The means, for those stations having kite data, are considered reliable up to 4 km; and those for the airplane stations, on the whole, are considered to be reliable up to 5 km, but, because some of the periods of record are for only 1 year, the mean value may be affected by the abnormality of the year.

It is desired to call attention to the fact that the data in the previous summary,[1] published in 1922, are in very good agreement with those presented here. The previously published curves of the various elements plotted against height follow closely those in the present publication. The maps for the standard levels, upon which were plotted the seasonal mean values of pressure, temperature, and relative humidity for winter and summer, although they were necessarily greatly smoothed, are in remarkable agreement with the corresponding isograms shown in this summary, which are only slightly smoothed.

This summary has been compiled in an attempt to give, with the available material, some idea as to how the several meteorological elements vary with height and with the season of the year.

DATA

The material consists of data obtained by means of sounding-balloon, kite, and airplane observations. These observations were made as stated in the introduction, page 2. The balloon soundings were usually made as a part of a predetermined program. Some of these were made on days or during months designated by the International Aerological Commission; others were part of proposed investigations initiated by the United States Weather Bureau. In this latter class are the series of observations made at 12 stations in 1927–28, at 10 stations in 1929–30, and at other places in earlier years. In the former class are those made at Broken Arrow, Groesbeck, Royal Center, Omaha, Dallas, Ellendale, and Pembina. The observations in a *series* were usually made once a day. In the Polar Year 1932–33, however, observations were made in groups of three ascensions with two groups each month, each of the three ascensions being 6 hours apart. That is, three observations were made in approximately 12 hours; however, not all three observations were used in this summary. In determining how many and which observations to use, the rule followed was: If the choice was between the 8 a. m. and the noon observations, or between the noon and the midnight observations, the higher one was chosen, but if all three observations were available, the 8 a. m. and the midnight ascensions were both used, because the midnight ascent was always made in the calendar day following that of the 8 a. m. sounding.

The temperature records are available for all of the observations, hence the number of temperature values used to obtain the means is in several cases greater than the number of values used for the means of the other elements. However, in the data for Maxwell Field there are fewer observations of temperature than of pressure and humidity for July 1935.

The temperature values in the Polar Year observations have been corrected on the basis of an insolation effect determined in a study by Ballard.[2]

The pressure data consist of a somewhat smaller number of observations than do those of temperature. This is due partly to the fact that a monthly summary of pressure data was made for the kite stations for the first 2 years of operation only and partly to the fact that pressures were not included in the published data of observations made at Blue Hill, nor for those made at St. Louis (1904–7) under the direction of the Blue Hill Observatory.

In like manner, the humidity data are less numerous

[1] W. R. Gregg, An Aerological Survey of the United States, Part I. Results of Observations by Means of Kites, MONTHLY WEATHER REVIEW Supplement 20, 1922.

[2] Some Results of Sounding-Balloon Observations During the Second International Polar Year August 1932 to August 1933, inclusive. J. C. Ballard, MONTHLY WEATHER REVIEW, February 1934, 62: 45–53.

than those of temperature. This condition is due to the fact that the humidity element of the meteorograph was sometimes faulty and also to the fact that some of the early observations were made with meteorographs having no humidity element.

The density data were computed for only seven stations, and not for all seasons at these seven. Only those seasons were used for which stratosphere soundings were available for the station. Densities were computed according to the formula given in the "Smithsonian Meteorological Tables." [3] One constant was altered somewhat from the value given in the tables: The value of the complement of the density of water vapor used was 0.377 instead of 0.378, as given in the tables [4]; the average value of the density of water vapor as determined experimentally is 0.623 rather than 0.622. The density values were computed chiefly for the convenience of aeronautical engineers and others interested in aviation.

The extreme temperatures are the lowest and highest temperatures at the standard levels above each station. These values are published for levels up to 12 km in some cases, although for most of the stations they are given for no levels higher than 5 km. These are not values which have been observed at the *significant* levels, but are the interpolated values at the standard levels; that is, they are the values taken from the temperature-height curve.

The minimum pressures were obtained by arbitrarily assuming surface and upper-air conditions of a sufficiently extreme nature to give pressures for the standard levels of a lower value than could be reasonably expected to actually occur.

PROCEDURE

The mean temperatures were determined by the method of differences, that is, by totaling the sums of the differences of temperature between corresponding pairs of successive standard levels and dividing this total by the corresponding number of observations for the season. The quotient was taken to be the mean difference of temperature between the two levels. The mean surface temperature was obtained by dividing the sum of the surface temperatures by the total number of observations. To this seasonal mean surface temperature was added algebraically the mean difference of the next higher level to obtain the mean temperature of that level, and so on successively for each level. The computations were carried out to tenths of a degree, centigrade.

The method of differences was used because it is thought to be somewhat more reliable than simple arithmetic averaging when the number of observations decreases with altitude.[5] This undoubtedly holds true for the troposphere, but in the region of variation of the tropopause a question of applicability arises. However, since but few of the soundings failed to extend to the 15-km level, and since the difference method is known to hold above that level, the method, for the purpose of this summary, is applicable throughout the atmosphere.

In a few Polar-Year soundings where both the 8 a. m. and the midnight observations were used and where the noon flight was higher than either or both of them, if the lower ascension reached 10 km, the lapse-rate for noon was used to supply values for the missing levels. This arbitrary procedure was followed in only three instances: Dallas on August 25 and Omaha on August 25 and November 10, 1932.

[3] Smithsonian Meteorological Tables, 5th Revised Edition, 1931, p. lxxx.
[4] Loc. cit., p. lxvii.
[5] A. Wagner, "Kritische Bemerkungen zur Differenzenmethode", Beiträge zur Physik der Freien Atmosphäre XXI Band, Heft 3, 1934, pp. 269-282.

The pressure and humidity seasonal mean values were determined in the same manner as were the temperature values. These two elements were computed to whole millibars and to integral values of percentage, respectively. For the surface and for the first level above the surface, however, the mean pressure is given to tenths of a millibar.

It should be noted that the seasonal mean values of temperature and humidity for Blue Hill are the arithmetic means of the published monthly mean values. The same is true in the case of Mount Weather for pressure and humidity.

The density values were determined by inserting the mean values of temperature, pressure, and relative humidity for the various levels in the formula referred to on page 3. The actual computation of the values was carried out by using the equivalent formula:

$$\rho=\frac{0.3477}{272.5+t}\,(B-0.377e),$$

where ρ is the density in kg/m^3, t is the seasonal mean temperature for the level in °C, B is the seasonal mean barometric pressure in mb, and e is the vapor pressure determined from the seasonal mean values of humidity and temperature. The densities were evaluated to the third decimal place in kg/m^3 and then converted into lbs/ft^3 to four places.

The extreme temperatures were determined by taking the highest temperature, at the standard levels, of all individual soundings. In some cases the number of observations is considered too small to yield representative extremes. Therefore, 16 stations were eliminated from the class for which extremes are published. None of the 39 stations has less than 10 observations. Ten observations are too few to indicate either the full range of temperature or the month in which to expect an extreme temperature. The extremes are published accordingly with these qualifications in mind.

The extreme pressures were obtained by arbitrary methods. The lowest sea-level pressure observed in the United States, 26.35 inches, occurred on the Florida Keys during the hurricane of September 1935.[6] Therefore, it was assumed that the surface pressure of a station at sea level is 27.00 inches (914.3 mb.) and the surface temperature 50° F. (10° C.) with a dry adiabatic lapse-rate up to the point where the temperature reaches −90° C. From this point upward to 12 km an isothermal lapse-rate was assumed. A second situation was assumed in which the surface pressure was taken as 29.00 inches (982.1 mb.) and the surface temperature as 10° F. (−12.2° C.), with the same assumptions as to lapse-rate as in the first case. On the basis of these assumptions, curves were constructed using values obtained from the adiabatic chart; these values were checked by an algebraic formula [7] for several points up to the isothermal region.

DISCUSSION

The seasonal changes in mean temperature in the troposphere (fig. 2–8) seem to be more pronounced between an intermediate season and the following extreme season than between an extreme season and the following intermediate one. That is, the temperature increase is greater from spring to summer than it is from winter to spring; also, the decrease is greater from autumn to winter than it is from summer to autumn. That the mean tempera-

[6] W. F. McDonald, The Lowest Barometer Reading in the Florida Keys Storm of September 2, 1935, MONTHLY WEATHER REVIEW, October 1935, 63: 295.
[7] Handbook of Aeronautics, Gale and Polden, Ltd., London 1931, p. 566.

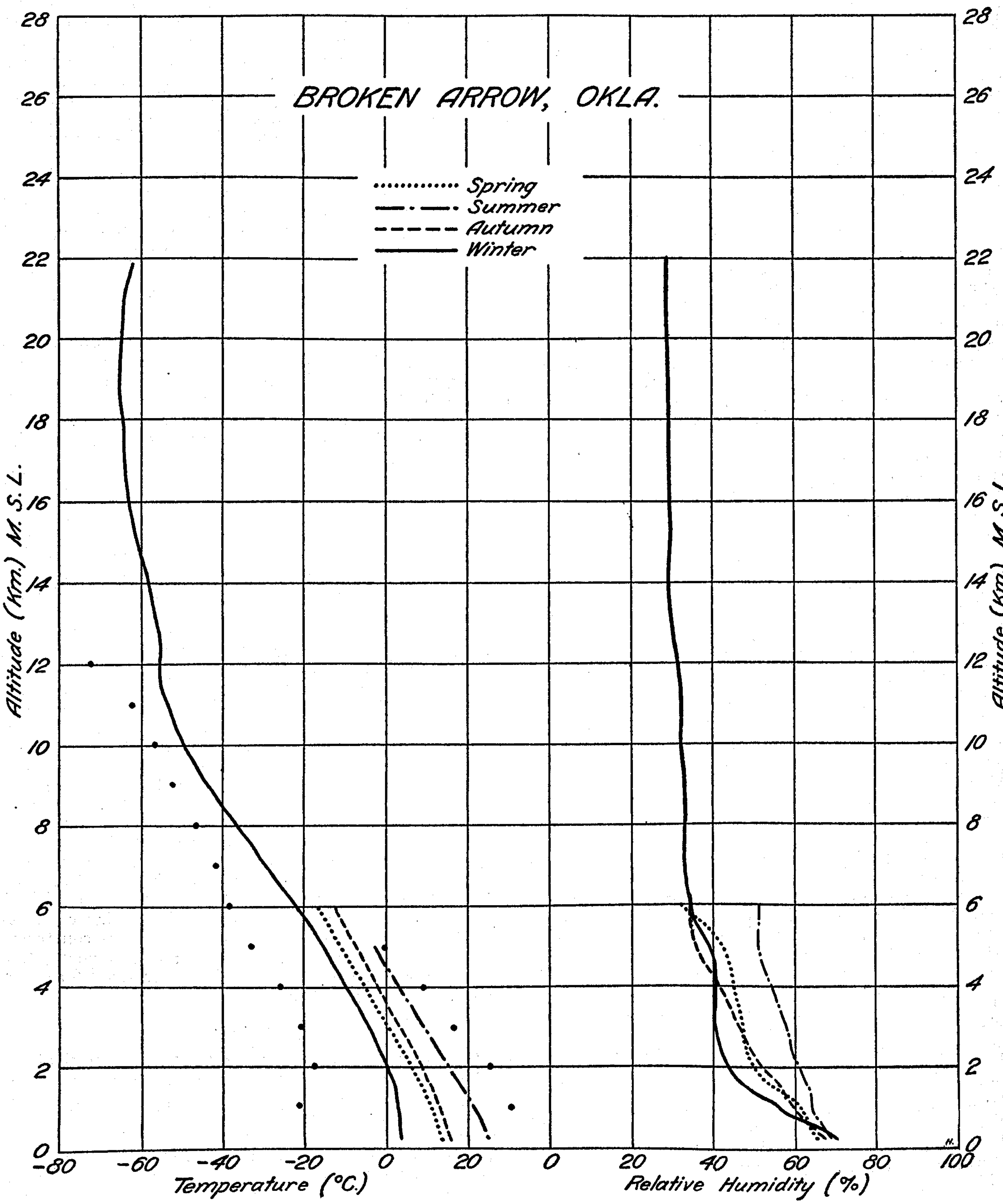

FIGURE 2.—Seasonal mean-temperature and humidity curves for Broken Arrow, Okla. Dots represent the extreme temperatures for the indicated levels.

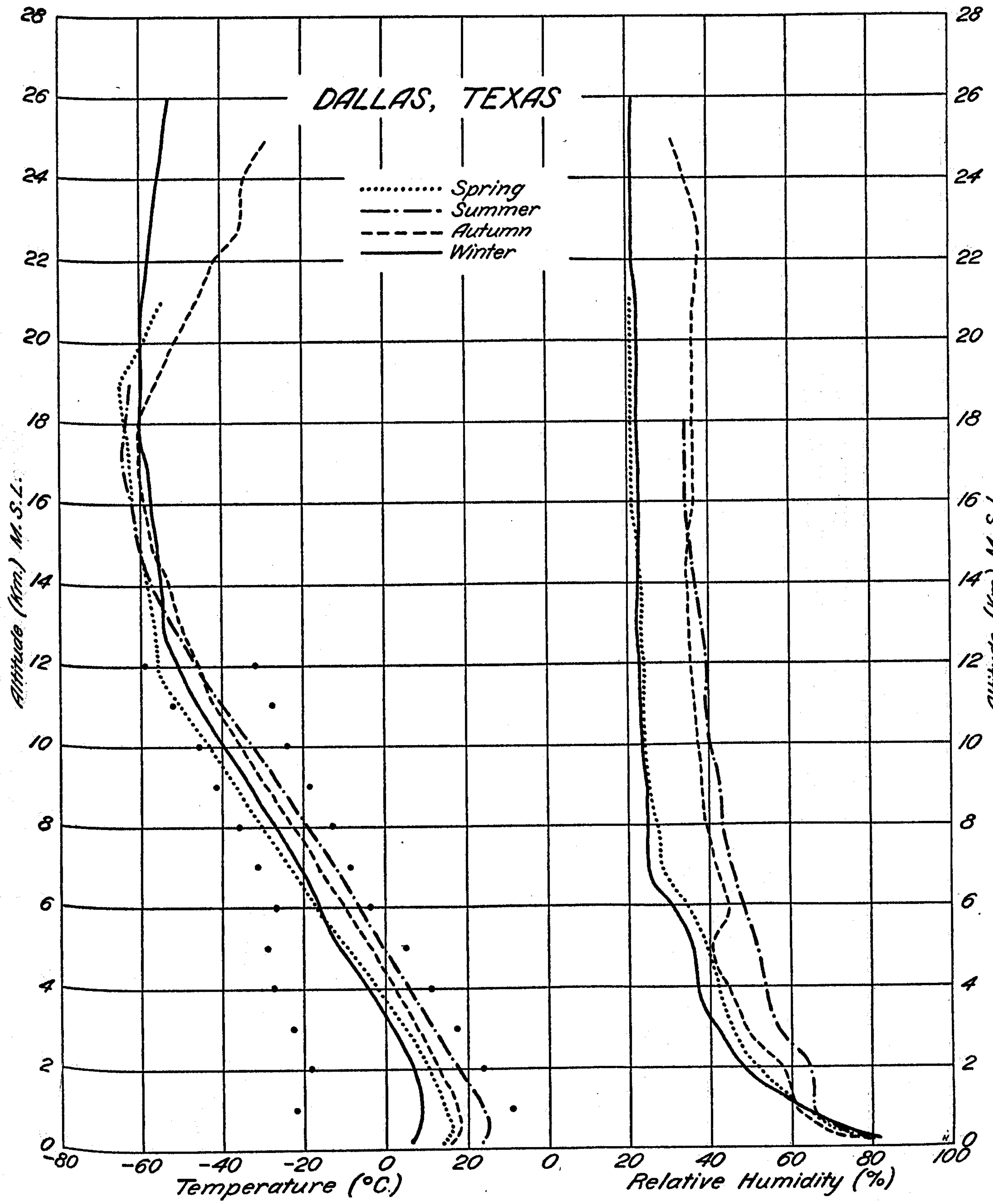

FIGURE 3.—Seasonal mean-temperature and humidity curves for Dallas, Tex. Dots represent the extreme temperatures for the indicated levels.

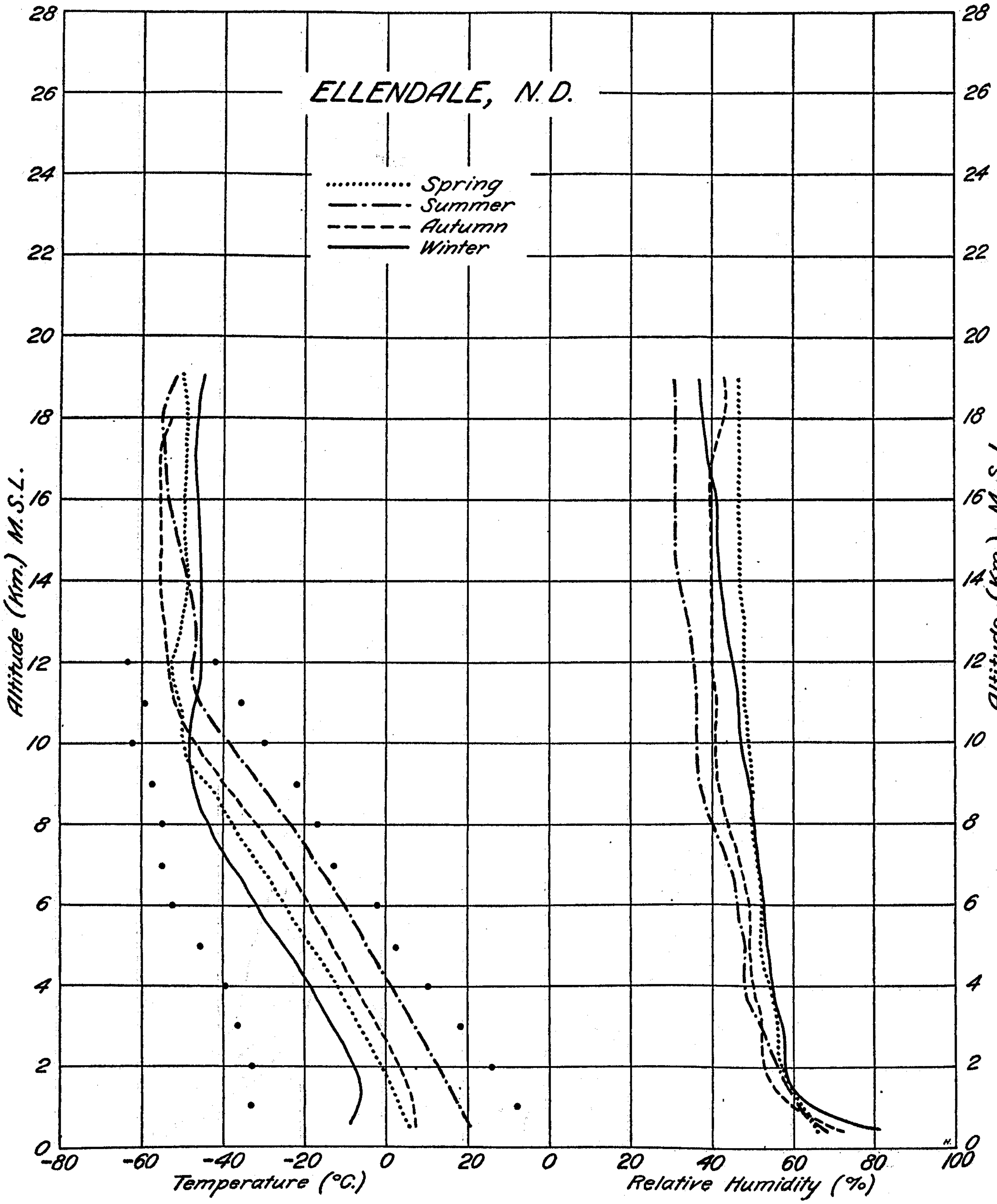

FIGURE 4.—Seasonal mean-temperature and humidity curves for Ellendale, N. Dak. Dots represent the extreme temperatures for the indicated levels

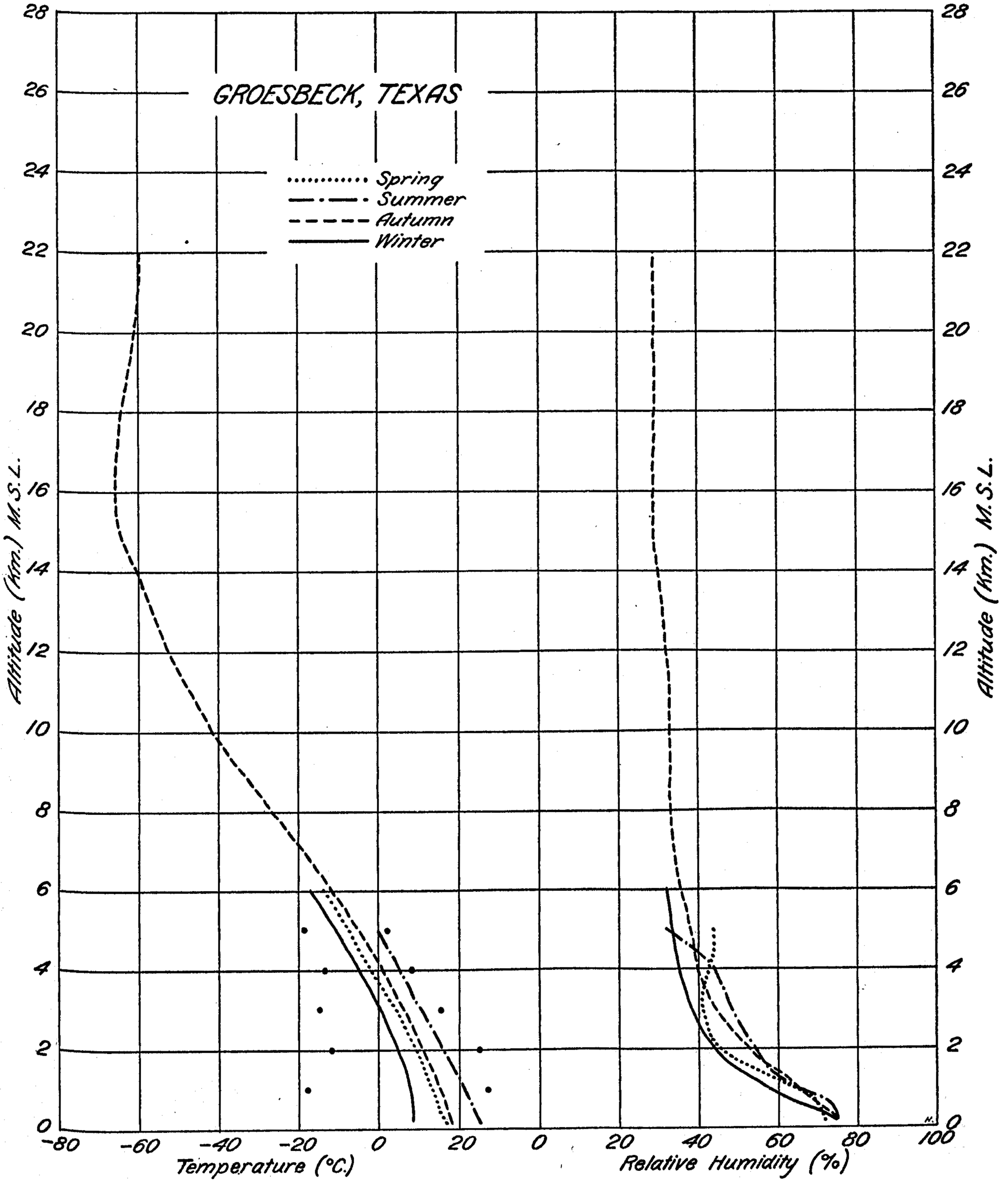

FIGURE 5.—Seasonal mean-temperature and humidity curves for Groesbeck, Tex. Dots represent the extreme temperatures for the indicated levels.

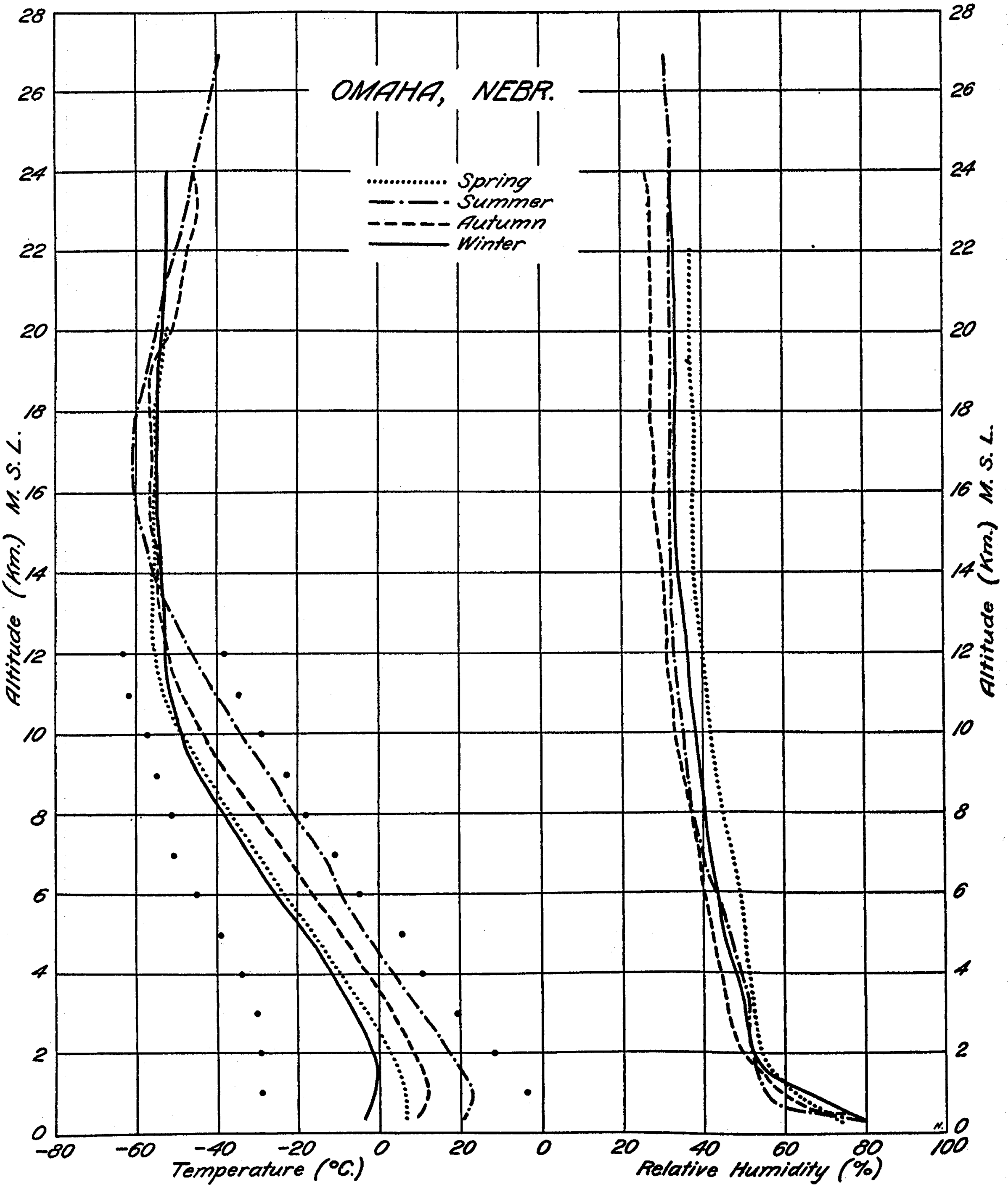

FIGURE 6.—Seasonal mean-temperature and humidity curves for Omaha, Nebr. Dots represent the extreme temperatures for the indicated levels.

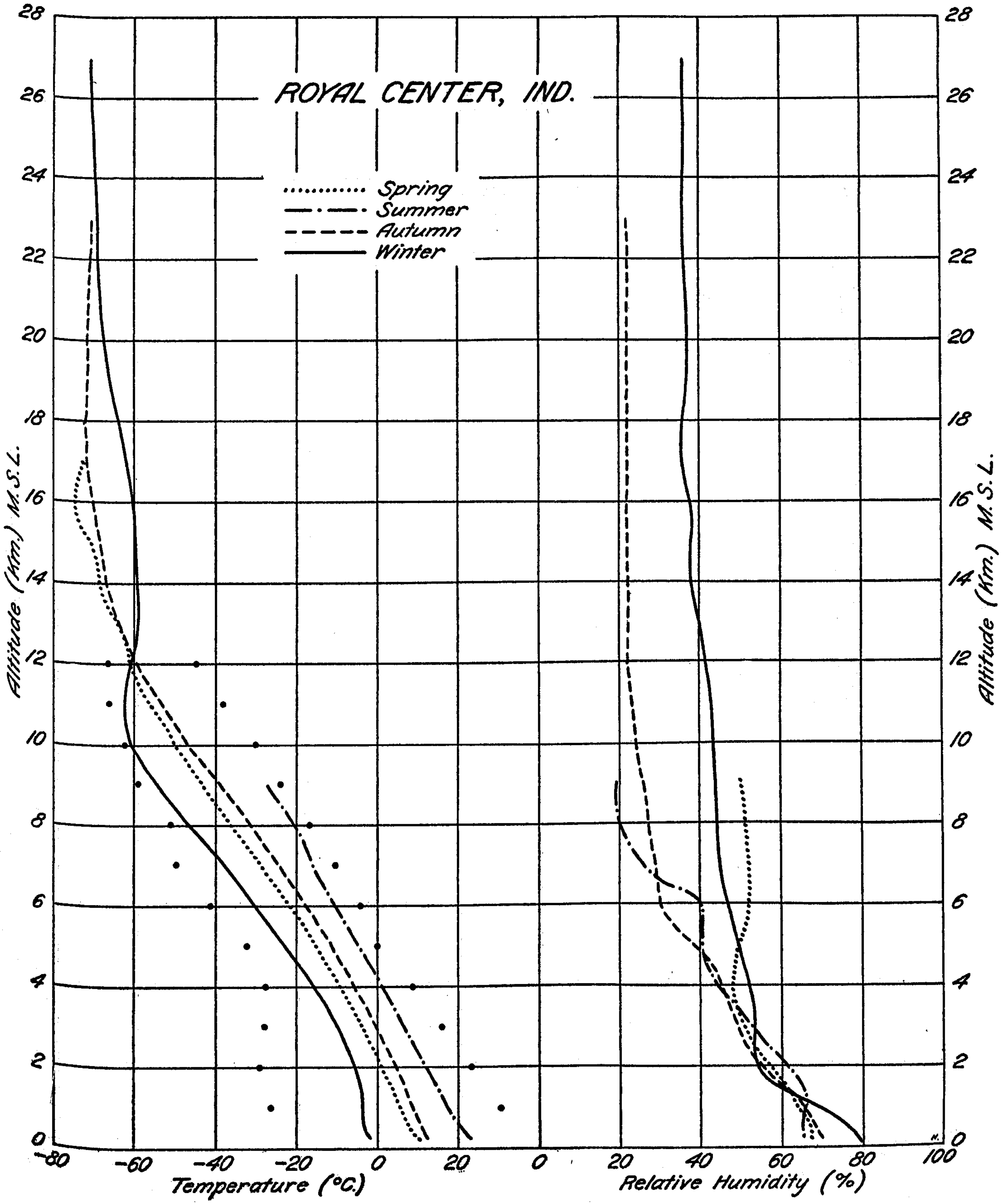

FIGURE 7.—Seasonal mean-temperature and humidity curves for Royal Center, Ind. Dots represent the extreme temperatures for the indicated levels.

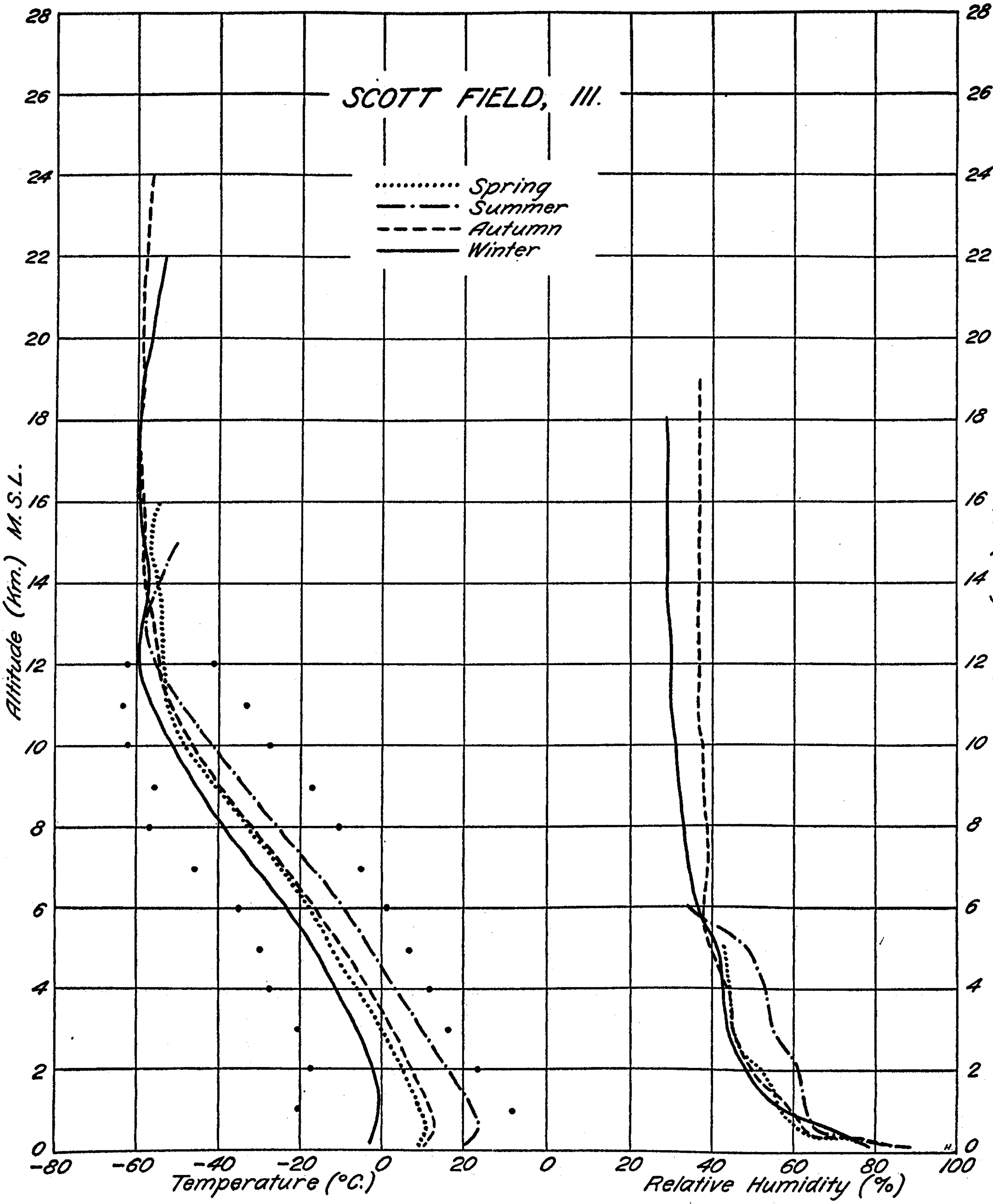

FIGURE 8.—Seasonal mean-temperature and humidity curves for Scott Field, Ill. Dots represent the extreme temperatures for the indicated levels.

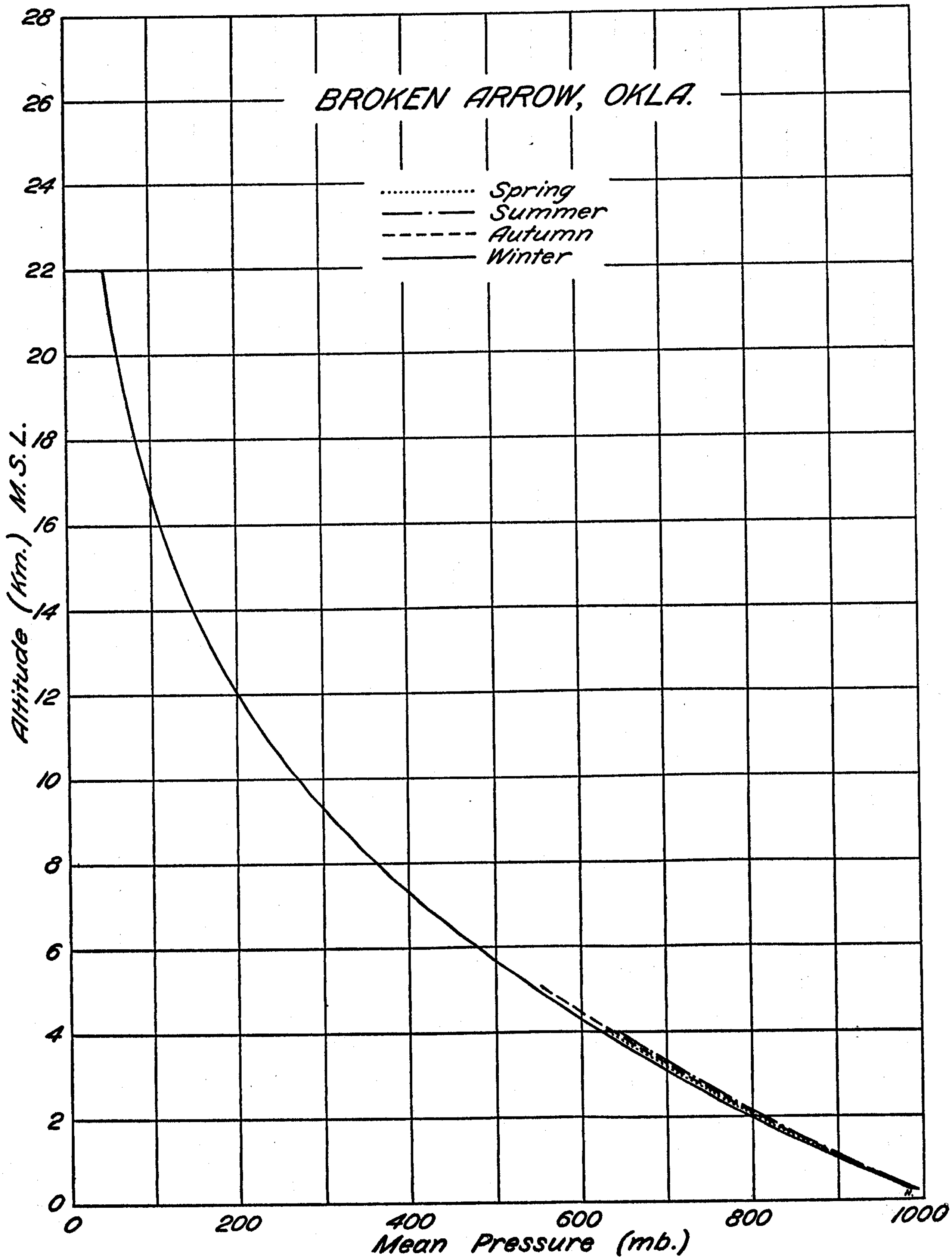

FIGURE 9.—Seasonal mean-pressure curves for Broken Arrow, Okla.

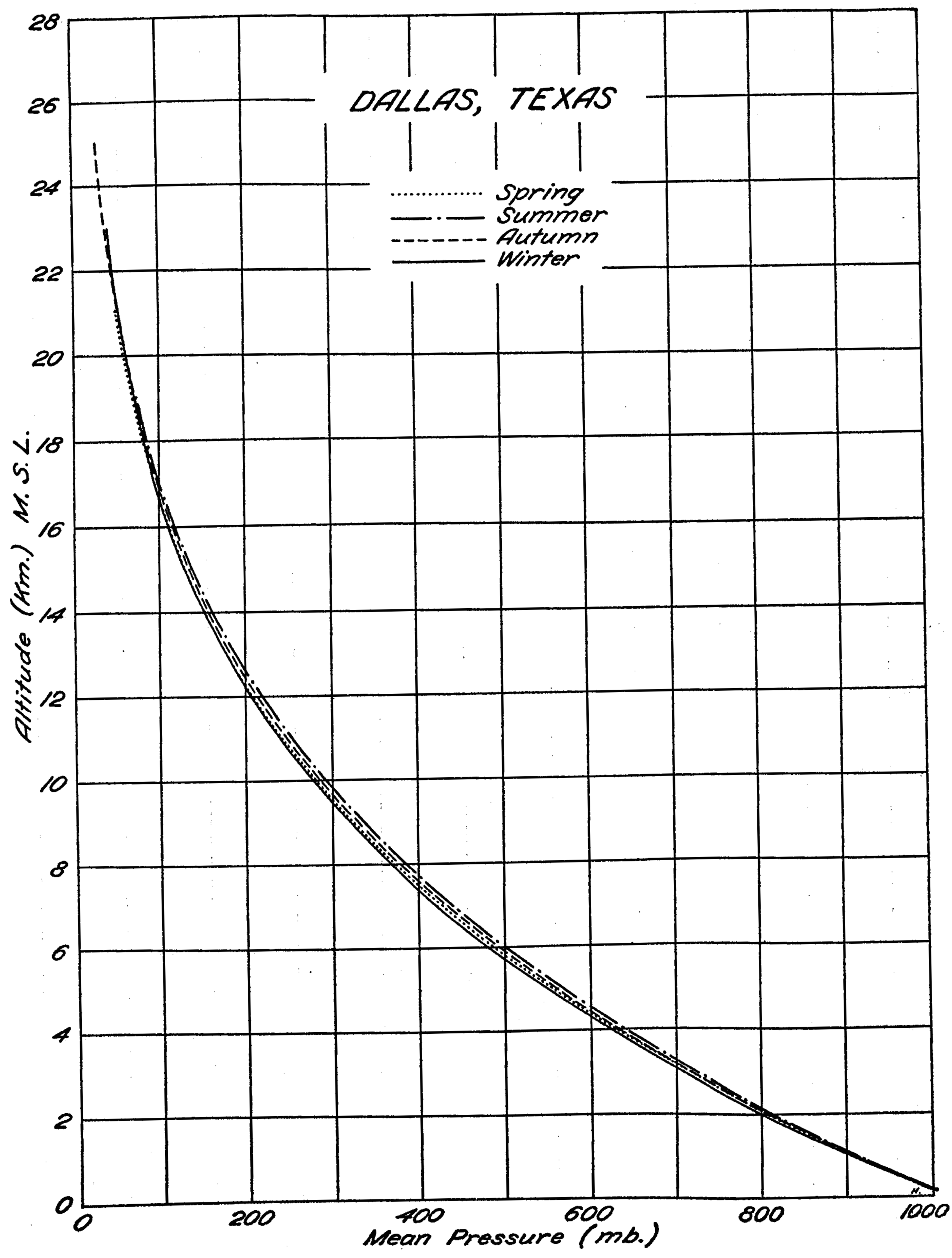

FIGURE 10.—Seasonal mean-pressure curves for Dallas, Tex.

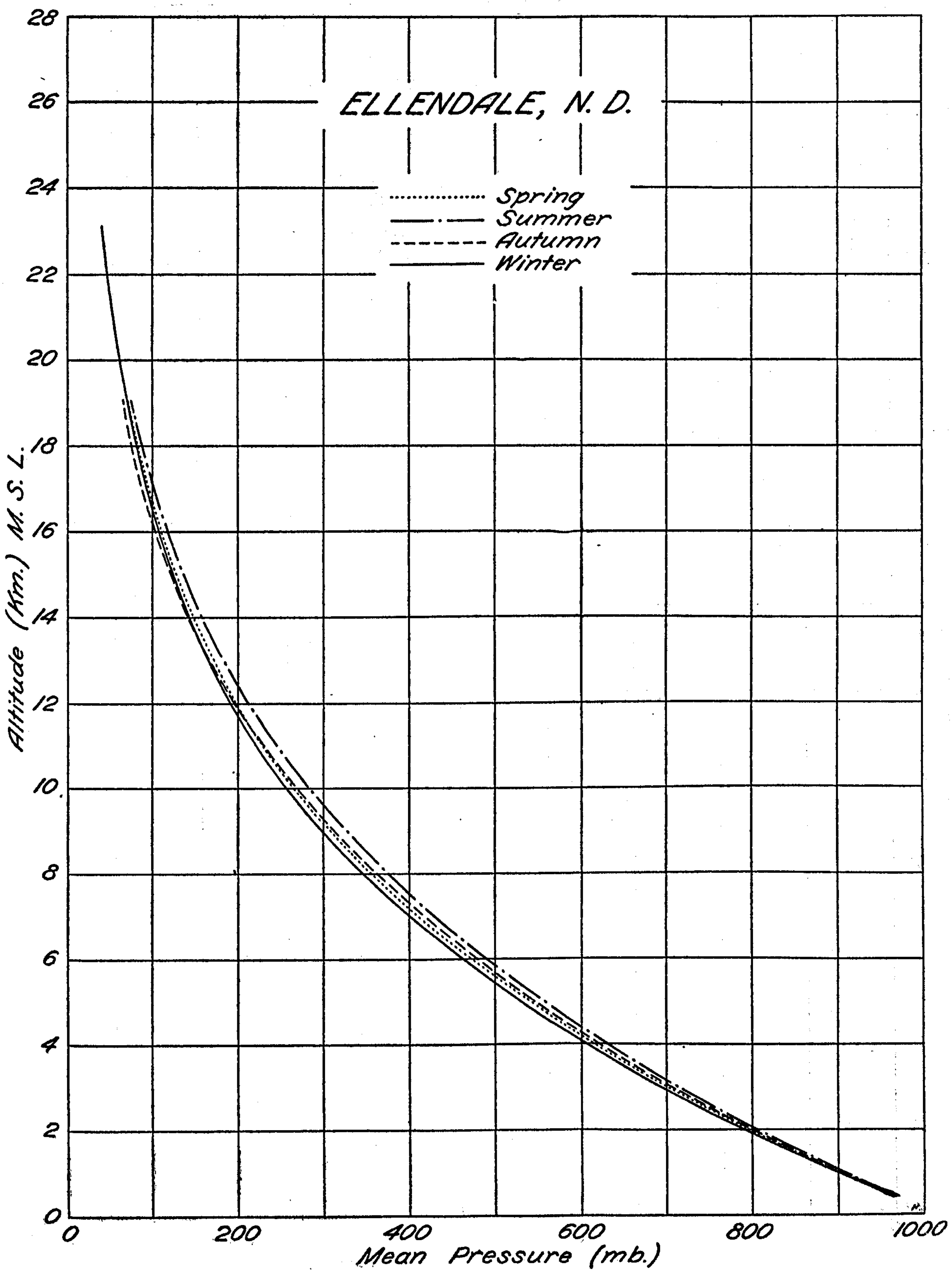

FIGURE 11.—Seasonal mean-pressure curves for Ellendale, N. Dak.

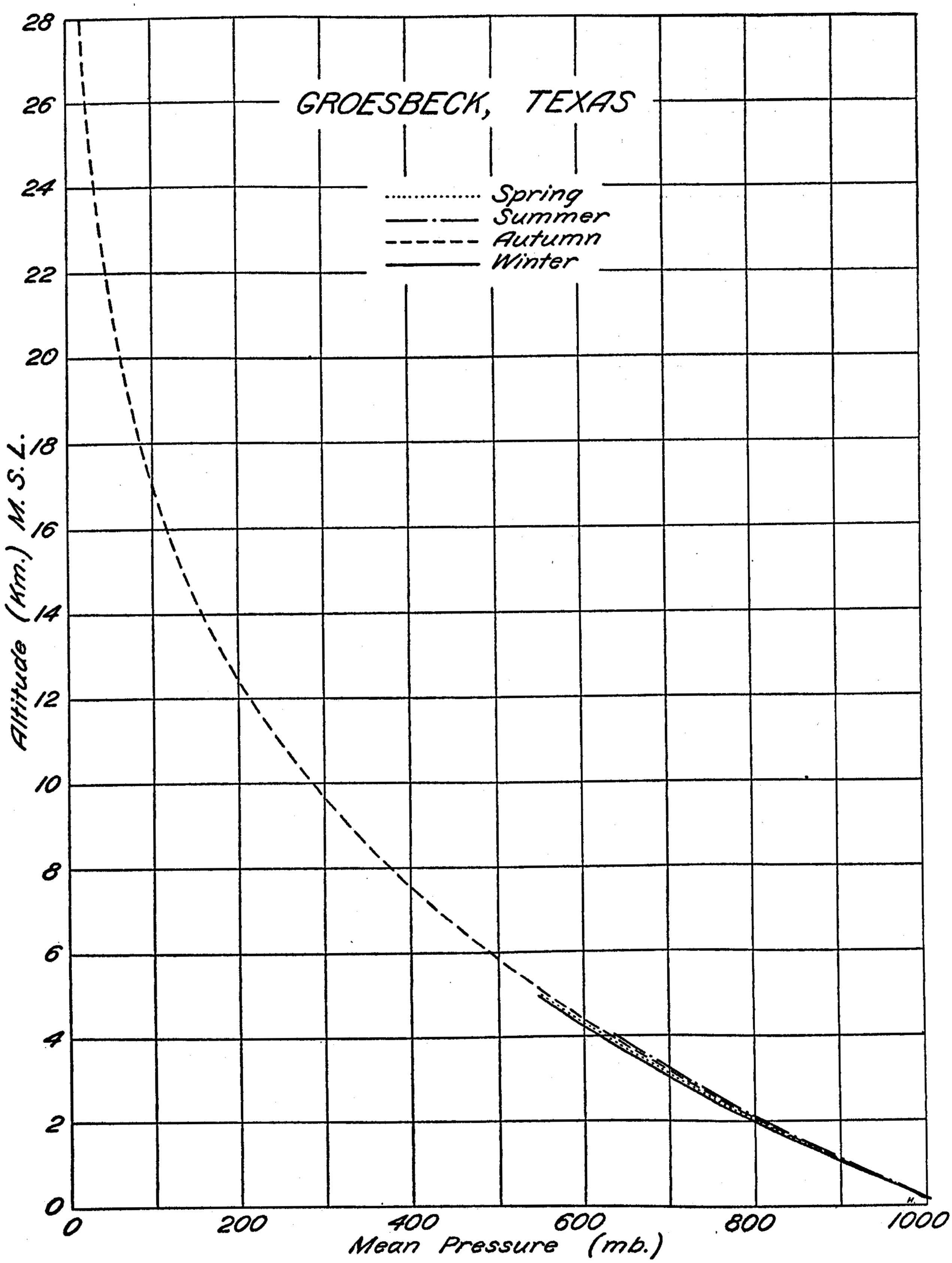

FIGURE 12.—Seasonal mean-pressure curves for Groesbeck, Tex.

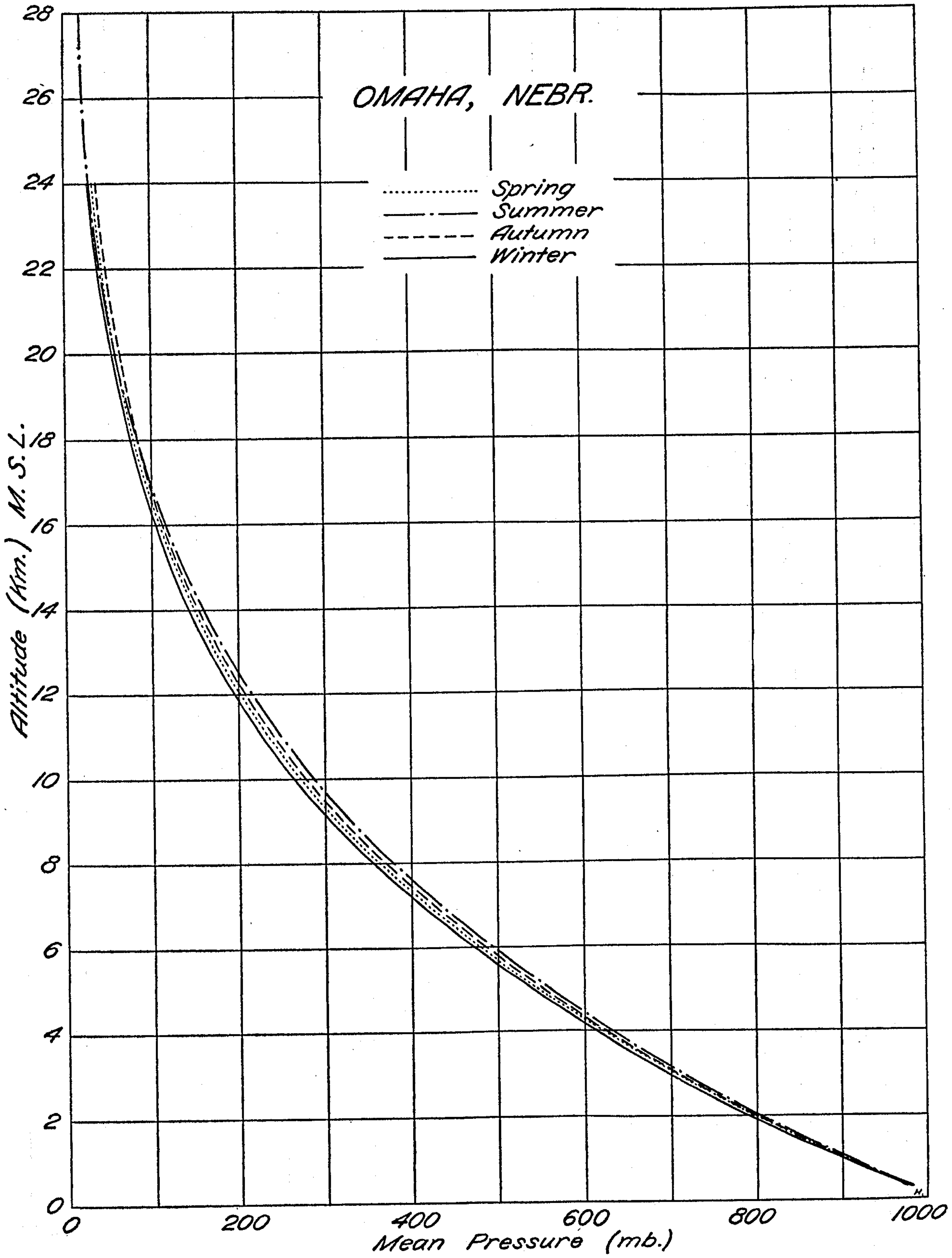

FIGURE 13.—Seasonal mean-pressure curves for Omaha, Nebr.

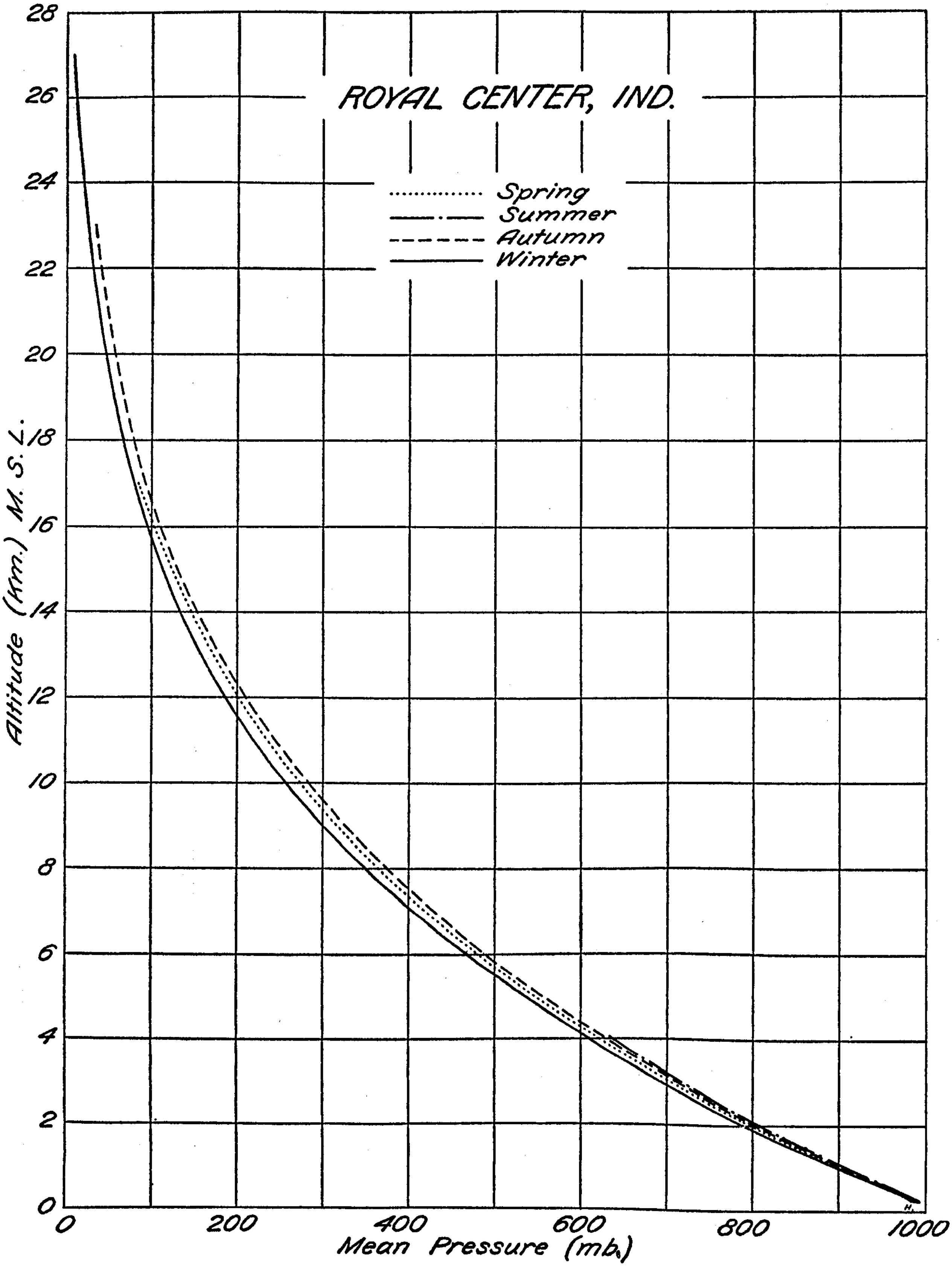

FIGURE 14.—Seasonal mean-pressure curves for Royal Center, Ind.

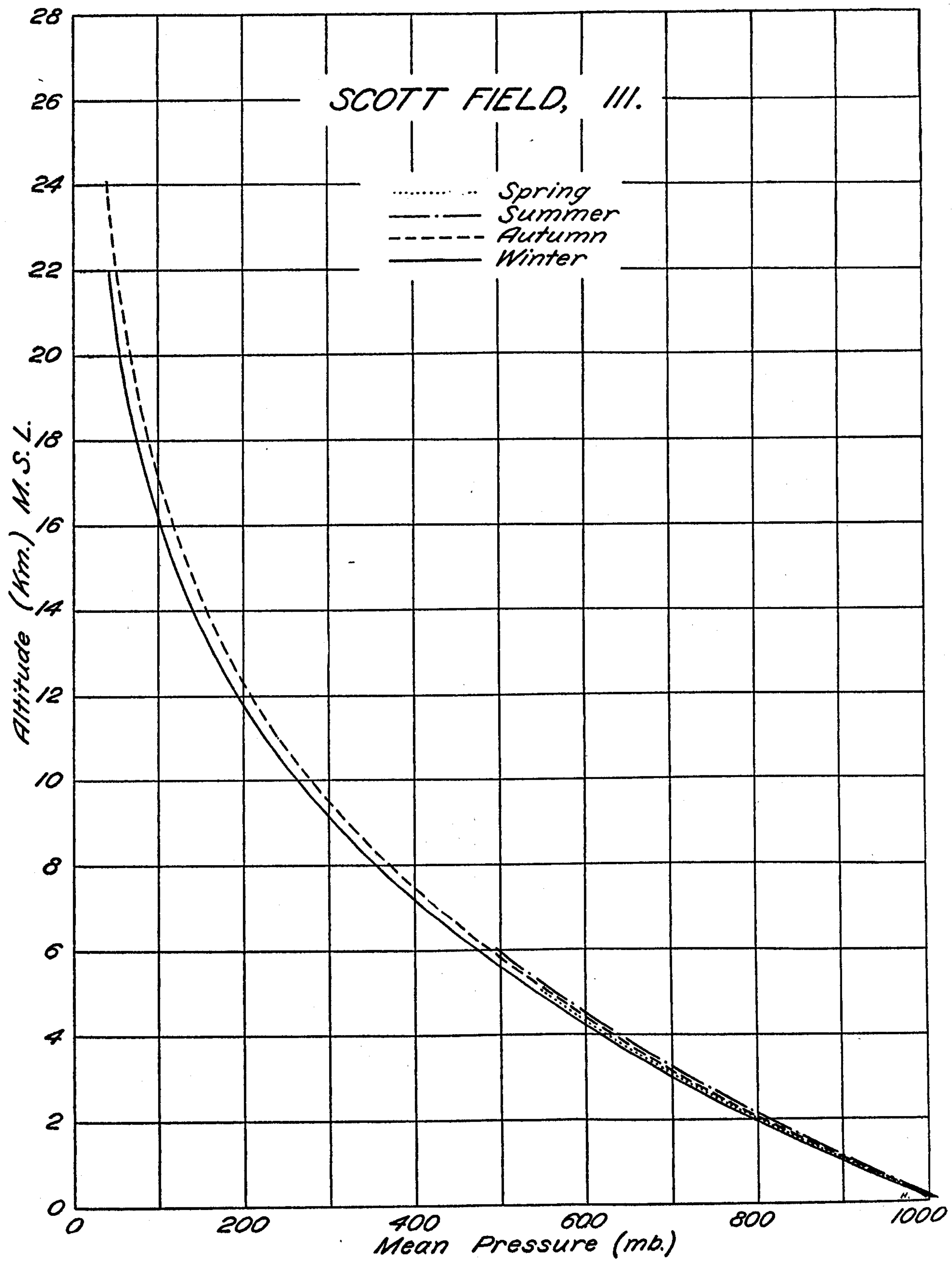

FIGURE 15.—Seasonal mean-pressure curves for Scott Field, Ill.

ture for spring is undoubtedly lower than the mean temperature of autumn, is shown in the seven graphs and is shown also in the tabular data for the other stations.

There seems to be a singular condition in the winter lapse-rate for Dallas. The lapse-rate has a smaller value above 6 km than would be expected from a consideration of the other stations, and as a result the winter mean temperatures for Dallas at high levels are warmer than the spring mean temperatures at corresponding levels. This irregularity may be explained as the result of the decrease in the number of observations from 251 at 5 km. to 8 at 6 km with rather small lapse-rates in the eight observations at 6, 7, and 8 km. Somewhat the same situation exists in the data for San Antonio (table 3), but in the opposite sense—the lapse-rate for spring is too great. These data indicate that the order of the seasons from cold to warm is winter, spring, autumn, summer, and this order holds up to about 10 km. Above 10 km the stratosphere complicates matters and the mean temperatures lose their characteristic surface order and assume, in some cases, the reverse order. That is, winter becomes the warmest season, with spring, autumn, and summer in order of warm to cold.

At three of the stations the tropopause is lowest and warmest in winter, while at the other two stations for which the records of the other seasons are available, spring is the lowest and warmest. It necessarily follows that the lowest tropopause carries with it a relatively warm stratosphere by virture of the definition of "stratosphere"; but the season of highest tropopause is not necessarily the season of *coldest* stratosphere. Steep inversions at the base of the stratosphere often exist with a high tropopause and a consequent high temperature in the stratosphere. In the four instances, where there are representative records for summer in the stratosphere, the tropopause is highest but not coldest in all cases.

In all seven cases for which curves were plotted the minima in the troposphere depart further from the mean values than do the maxima; in the stratosphere, on the other hand, the divergence is as often greater with one extreme as with the other. However, the number of observations in the stratosphere is so small that reliable extreme values are not yet ascertainable.

The curves and the longitudinal sections (figs. 24–27) indicate that the tropopause is higher for all seasons at the southern than at the northern stations. This difference in height of the tropopause seems to be most noticeable in winter and least in summer. The tropopause seems also to be definitely highest in summer and, for stations north of latitude 38° N., lowest during winter.

The latitudinal temperature gradient is, of course, greatest in the winter and smallest in the summer. This relation holds for all altitudes up to the tropopause. In the stratosphere, however, the temperature gradient is reversed, that is, for any given level the temperature increases with increasing latitude. There is no level, however, at which the latitudinal temperature gradient is zero at every station, even though it changes sign. This is due to the fact that the tropopause is higher in the south than it is in the north. Thus *for any level* which is lower than the level of the tropopause in the south and higher than the tropopause in the north, the temperature gradient from south to north will be negative to the intersection of that level with the tropopause and thereafter it will be positive.

The slope of the tropopause from south to north seems to be greatest in summer and least in autumn.

At the 1-km level during summer (fig. 29) there is a cold body of air extending down into the Ohio, Tennessee, and lower Mississippi Valleys. Whether this is due to an unusual year at Murfreesboro, or whether it is the normal condition, is a question to which the answer can be supplied only when more observations are available. The condition prevails up through the 5-km level during the summer season.

Just to the west of this cool region there is a warm strip extending up through Texas into southern Iowa. This warm area is very likely due to the prevailing south and southwesterly winds [8] over the area. It is most pronounced in the first 2 kilometers.

There is also a relatively cool area indicated in northern Florida and in the southeastern sections of Georgia and South Carolina. This may be due to the prevailing winds from the southeast over this area bringing in the cool air from the ocean and from the high pressure area to the east. This cool area is present only in the first 3 kilometers.

Spring (fig. 28) is cooler than autumn (fig. 30) in all cases at least up to 5 km, except at the surface at Atlanta, El Paso, Montgomery, Murfreesboro, and Spokane, and at 1 km over Atlanta.

The cool and the warm areas of the summer season are not so pronounced on the maps for autumn (fig. 30). The warm section, which extended from Texas up to Iowa in summer, is much smaller in autumn and is displaced considerably to the eastward; it is centered over southern Louisiana and extends northward to central Arkansas in the first km. At the higher elevations it is located to the southwestward over southeastern Texas. The cool area seems to have been displaced eastward and the wave in the isotherms is of much smaller amplitude than was evident in summer.

The winter maps (fig. 31) show that the warm area is confined solely to the Gulf and south Atlantic coasts. The cool wave is smaller in amplitude, but a second wave is apparent in Tennessee, Indiana, and lower Michigan. This second wave may be due to the unobstructed sweep of the cold masses of air moving south over central Canada and across the Great Lakes.

In spring the warm area again shows up strongly in eastern Texas, Louisiana, and Arkansas, where this phenomenon is well shown at all five levels. The cold area is not very pronounced at the 1 km and the 2 km levels, but it is rather well defined at the 3-, 4-, and 5-km levels.

The pressure curves (figs. 9–15) show that the mean pressure at the surface is greater in winter than in summer. This is corroborated by the tabular data for the other stations for which data are available for both seasons, with the exception of Boston, El Paso, and Cheyenne. However, at 1 km above the surface the summer mean pressure becomes greater than the winter mean pressure and remains greater in all cases, at least up through 5 km, with the exception of Cleveland, Oklahoma City, Philadelphia, San Diego, and Wright Field.

The intermediate seasons (spring and autumn) have mean values between those of summer and winter for altitudes below 15 km. In the cases of Ellendale, above 14 km, and Dallas, above 19 km, the mean values for autumn become lower than those for winter, but this is very likely due to singularities in the autumn soundings. At Omaha the highest mean pressures at altitudes of 19 km and higher occur in autumn. The mean pressures in spring are lower than those in autumn with the exception of the levels up

[8] An Aerological Survey of the United States, W. R. Gregg, Part II, MONTHLY WEATHER REVIEW SUPPLEMENT No. 26, 1926.

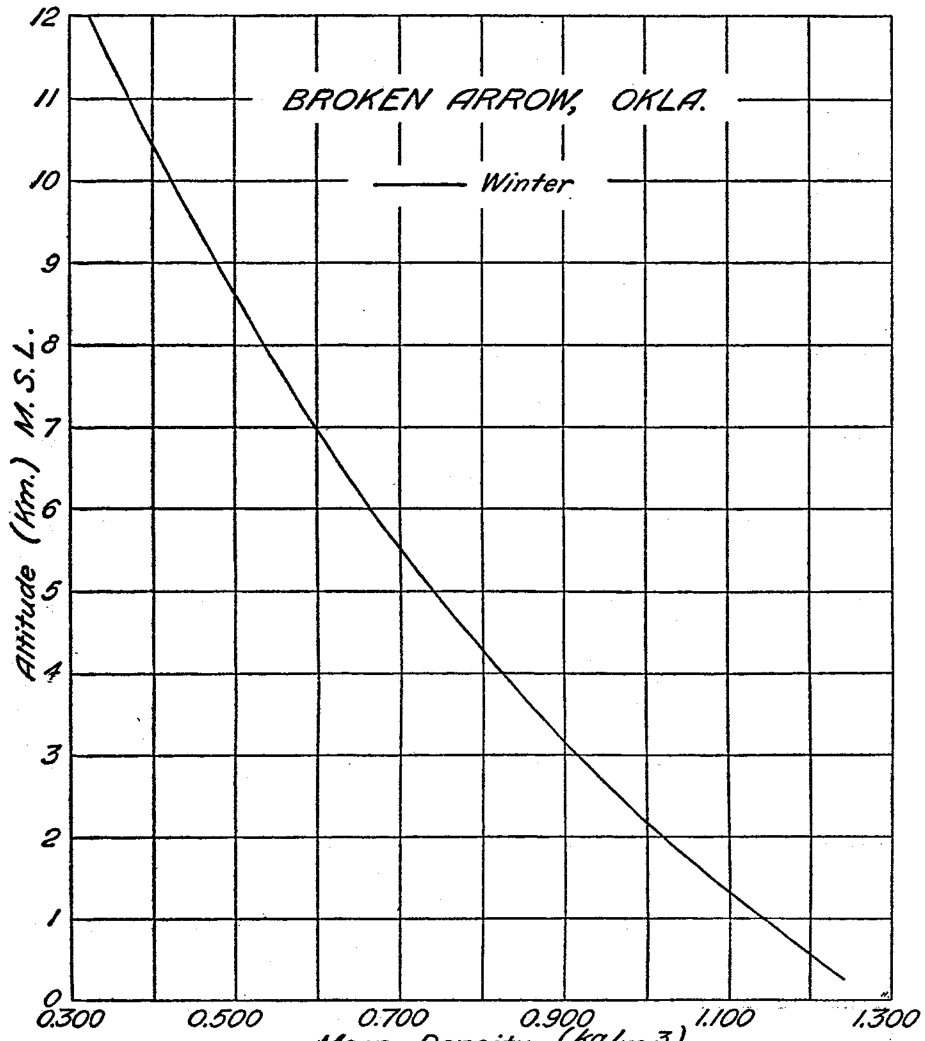

FIGURE 16.—Seasonal mean-atmospheric density curve for Broken Arrow, Okla.

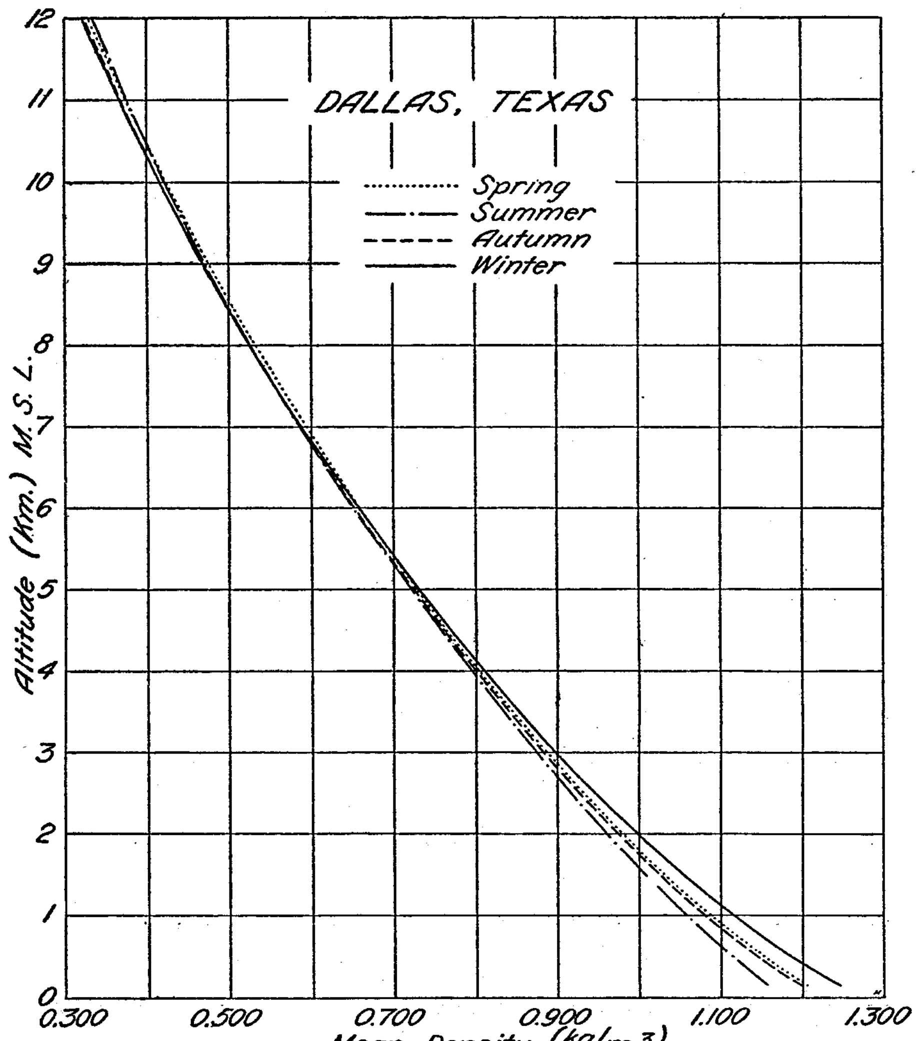

FIGURE 17.—Seasonal mean-atmospheric density curves for Dallas, Tex.

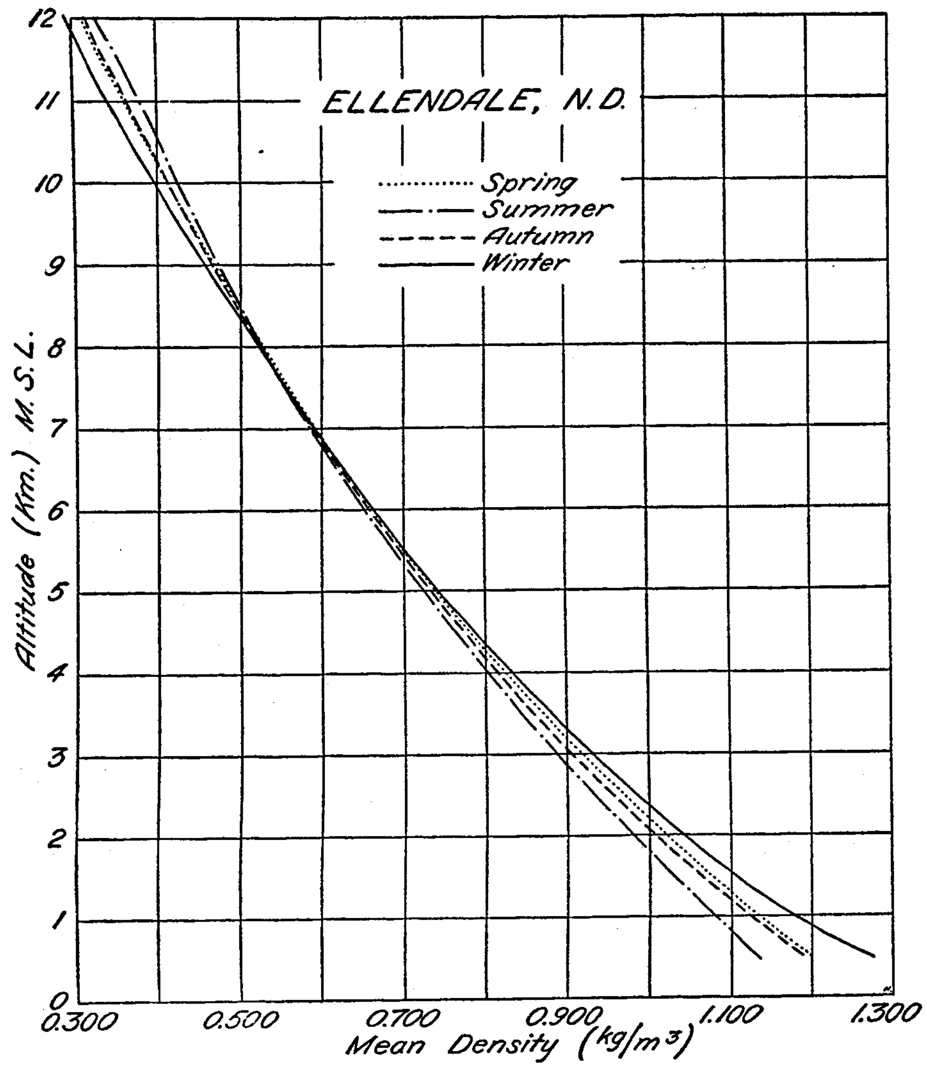

FIGURE 18.—Seasonal mean-atmospheric density curves for Ellendale, N. Dak.

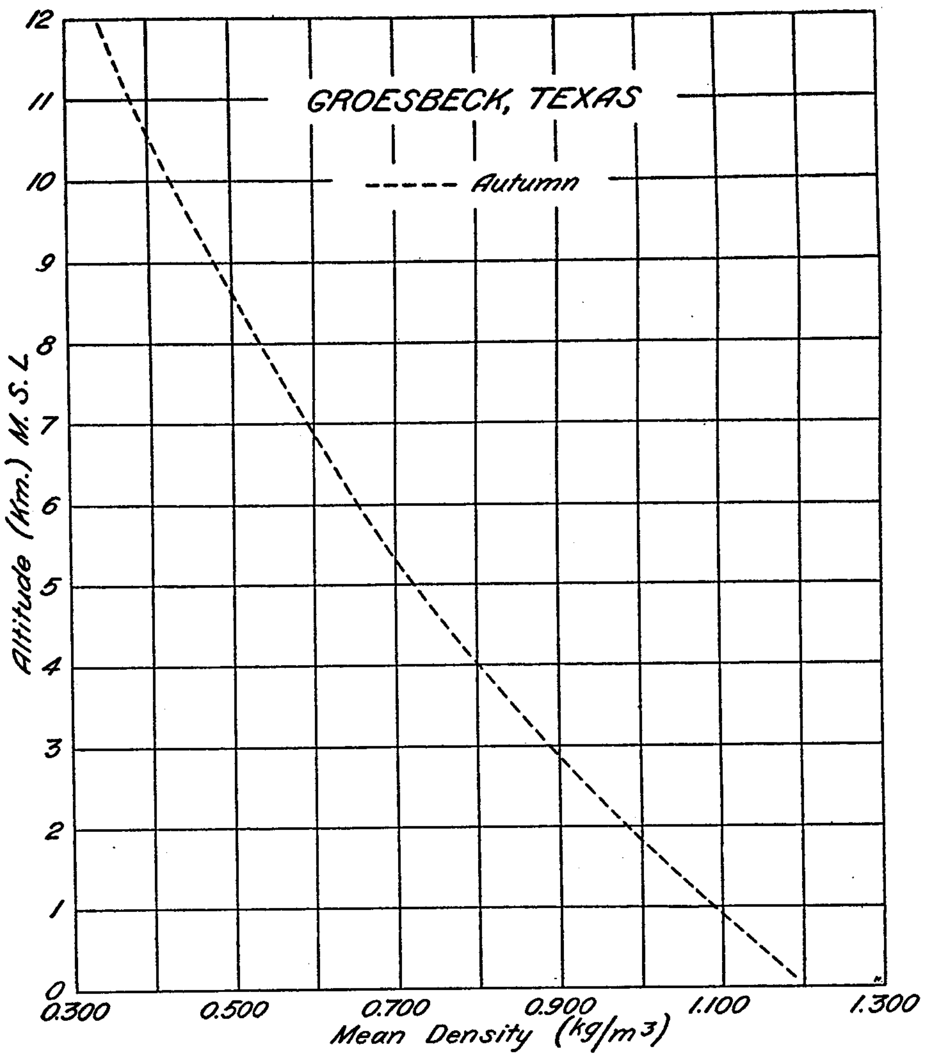

FIGURE 19.—Seasonal mean-atmospheric density curve for Groesbeck, Tex.

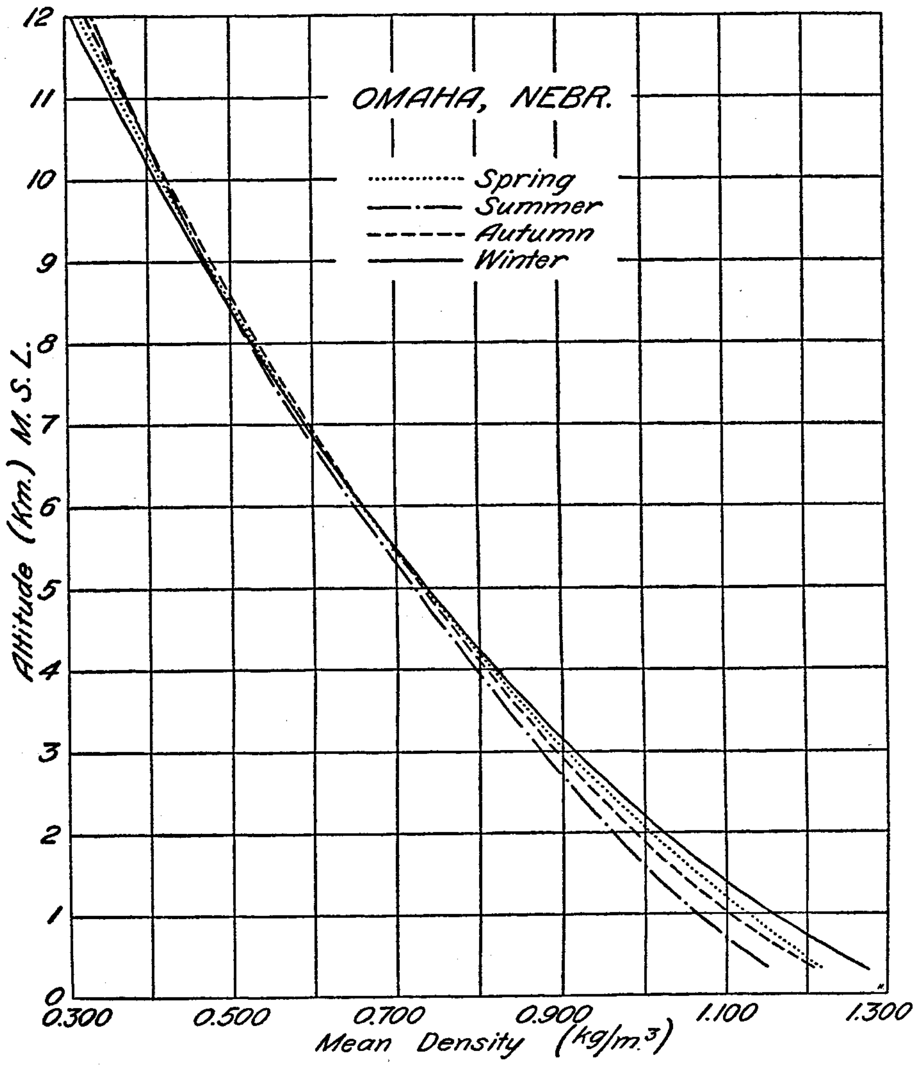

Figure 20.—Seasonal mean-atmospheric density curves for Omaha, Nebr.

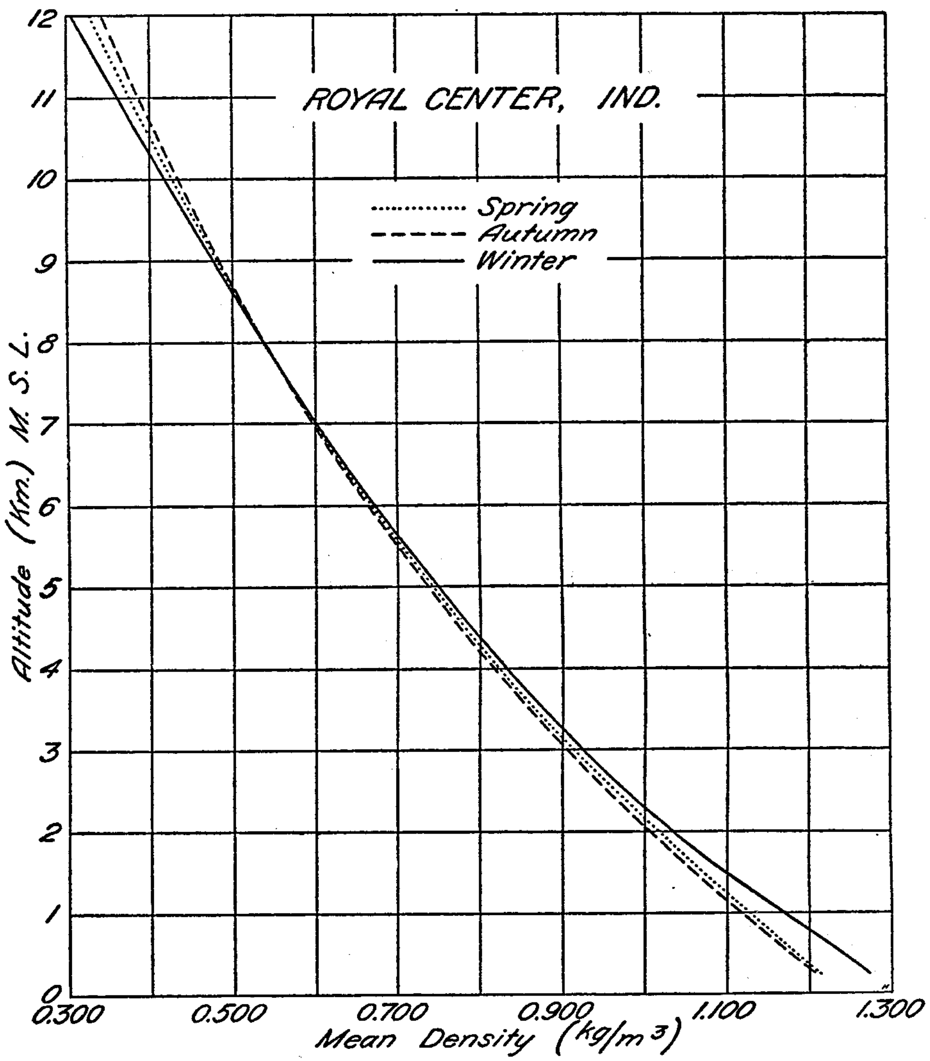

Figure 21.—Seasonal mean-atmospheric density curves for Royal Center, Ind.

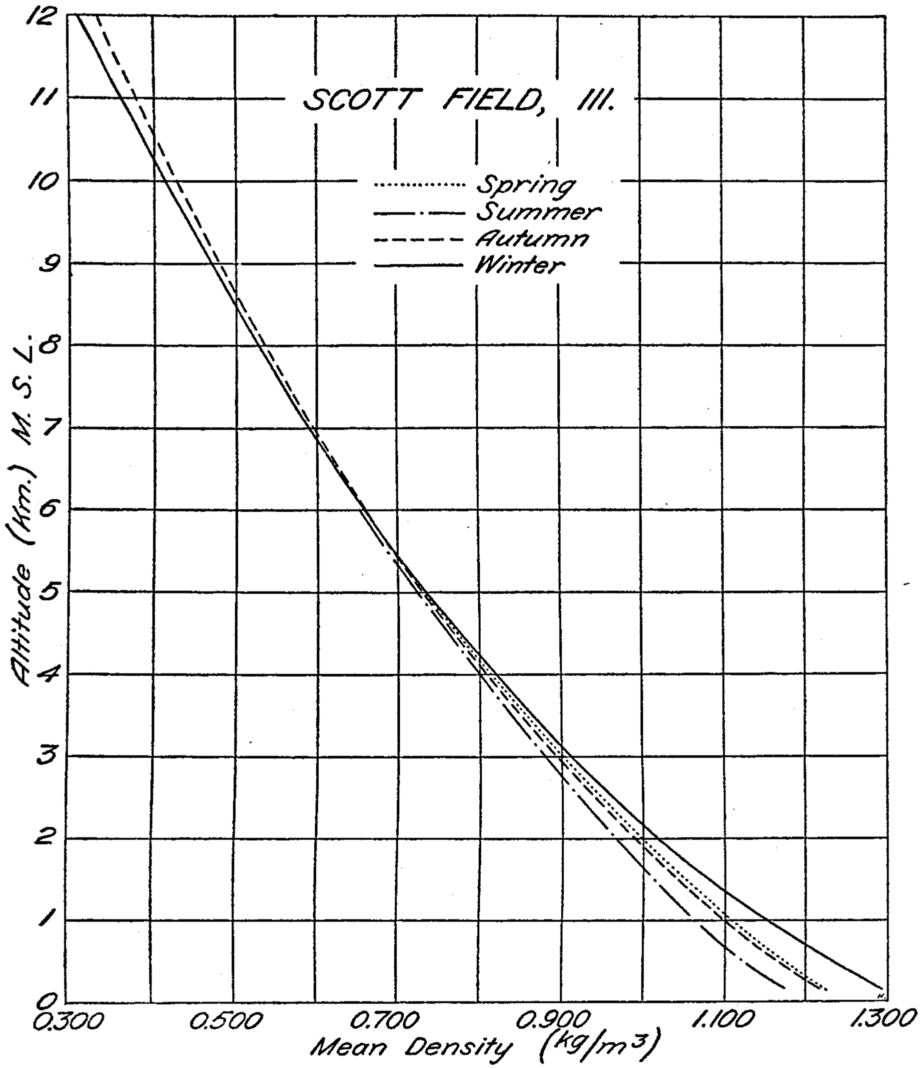

FIGURE 22.—Seasonal mean-atmospheric density curves for Scott Field, Ill.

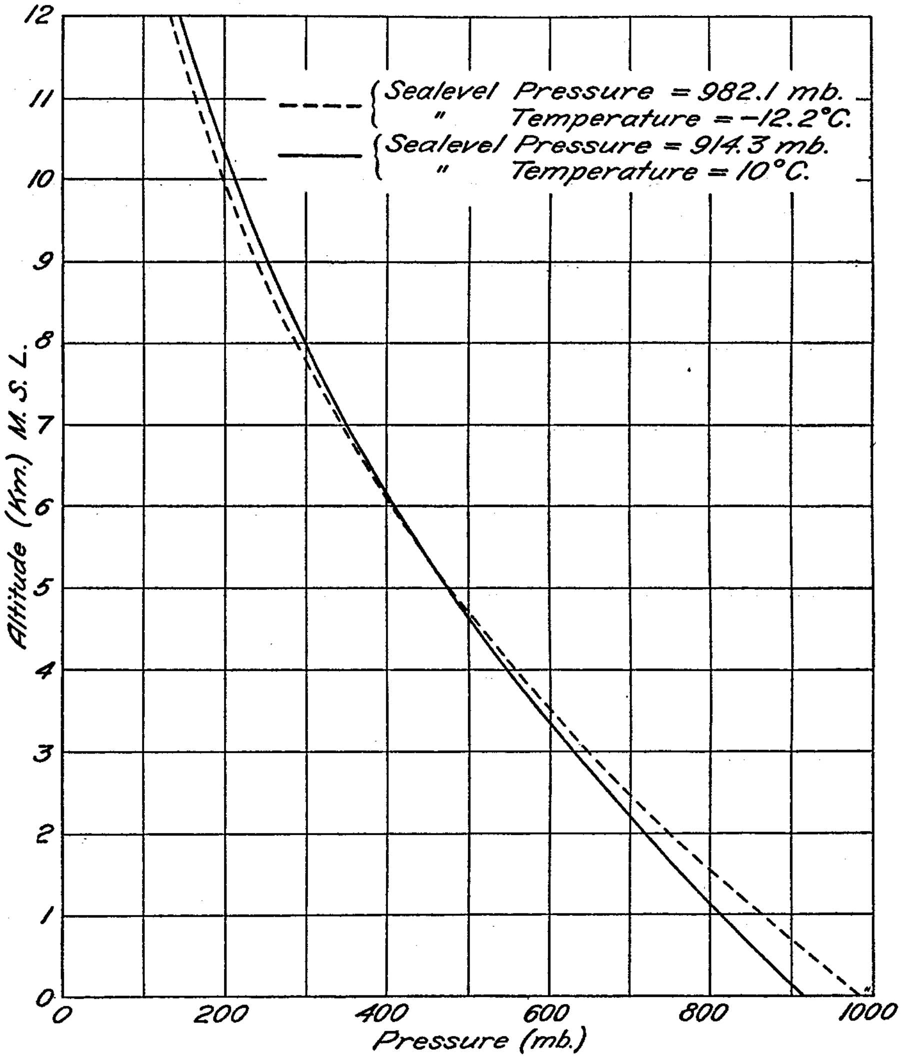

FIGURE 23.—Theoretical minimum-pressure curves.

to and including 3 km at Pembina, of the surface at San Diego, and of the levels above 12 km at Ellendale.

The greatest annual amplitude in the mean pressures is at the approximate mean altitude of the tropopause and seems to be of the order of 25 mb. Of the cases here presented the greatest difference is the 32 mb between summer and winter mean pressures at 8 and 9 km at Ellendale.

There appears to be a trough of low pressure (figs. 32–35) extending down through Wisconsin and Illinois in all four seasons and a similar one just to the west of the Appalachians. The trough in the central United States definitely extends all the way to the Gulf at the 1-km level in autumn and winter, but it is somewhat obscured in spring and summer, and the one to the east extends only to North Carolina in all four seasons. The pressure gradient, in the main, is from south to north; but there are also east-to-west and west-to-east gradients in some cases, especially at high levels. Only in summer and autumn, however, is a north-to-south gradient indicated, and this is limited to the Gulf coast. There seem to be two centers of high pressure—one off the south Atlantic coast and the other off the Gulf coast. The Atlantic HIGH extends farthest inland and farthest north, with the highest pressures during summer; in spring, on the other hand, it is weakest in pressure and extent. The Gulf HIGH is also strongest and farthest west in summer, and is weakest and farthest east in spring.

The distribution of pressure at the 2-km level is essentially the same as at the 1-km level. The one noticeable difference is the increase in the pressure gradient at 2 km over that at 1 km. In the southern United States this difference is not so pronounced in summer and autumn, but it is very evident during winter and spring; over the remainder of the country considered (east of the 100th meridian) the difference is very noticeable in all seasons.

The pressure distribution at 3 km is again very much the same as at 1 and 2 km. A north-to-south gradient appears at this level in the summer and autumn along the Gulf coast.

At 4 km the general distribution of pressure is the same as at the lower levels with the continued north-south gradient during summer and autumn, as was shown at the 3-km level.

The pressure distribution at 5 km is much the same as at 3 and 4 km, including the north-south pressure gradient in summer and autumn. The pressure gradient increases regularly with increase in altitude, and as a whole, is steeper at 5 km than at any of the lower levels.

The humidity curves (figs. 2–8) for the seven stations indicate that for the first 5 km the mean relative humidity values are higher in summer for the southern stations than at other seasons. For the northern stations, that is, Omaha and those north of Omaha, the higher humidities occur during the winter. The curves for Royal Center vary more than do the curves for the other stations. In general, the mean humidity values for spring and autumn lie between the summer and winter values. The values of humidity can be relied upon in summer only to about 10 km and in winter only to about 8 km. Above these altitudes the hygrometers record approximately the same humidity up to the maximum height reached.

The maps (figs. 36–39) for 1 km show that an area of low humidity exists in the upper Mississippi Valley in summer and it carries over into autumn. However, in winter and spring this region is characterized by high humidity in the first two levels. In summer the high humidity region is that of the Southeastern States. In winter and spring New England is a region of high humidity. The Southern States in winter, on the whole, have low humidity values, and in the spring the values are lower than during summer and autumn, although not so low as in winter.

At the 2-km level the distribution of the relative humidity values is much the same as at 1 km, except that in autumn there is an area of low humidity over southern Louisiana and southeastern Texas, as indicated by the data for Galveston. Also, in spring the mean value at Pensacola leads to an area of higher humidity on the Gulf coast.

The distribution at 3 km is practically the same at all seasons as at 2 km, except that during winter an area of low values is evident in the upper Mississippi Valley and the Lake Region, and persists through spring, as shown by the value at Detroit. The area of low humidity at 2 km over Galveston is emphasized at 3 km, having the support of an additional station in both summer and autumn. Murfreesboro shows high humidity in both winter and spring.

At 4 km the main difference in summer is the great extension of the low-humidity area, which was confined to the upper Mississippi Valley and New England at the lower levels. This area at 4 km covers the entire northern United States, with the lowest values being indicated in New York and New England. This low humidity area persists into the autumn season, but in a modified form. The 4-km level in winter and spring is much the same as the 3-km level.

In the distribution at 5 km a closed area of higher humidity is evident over the northern part of the Gulf States and southern Arkansas and southern Tennessee. The other seasons show no decided change at the 5-km level from the 4-km level.

The density curves (figs. 16–22) vary with consistent regularity, with the exception of the curve for the winter mean density at Dallas where the irregularity is undoubtedly due to the singularity of the temperature values during this season. The temperatures are affected, as was pointed out on page 18. The density is greatest at the surface during winter and least during summer; and in spring the density at the surface is consistently higher than in autumn at all stations. This order persists up to the "level of constant density"[9] at about 8 km, at which level it is reversed—summer having the greatest density with autumn, spring, and winter in order of decreasing density. To this pattern, however, the density values at Dallas do not conform. The variation of density with the season seems to be smaller at Omaha and Dallas at 12 km than at Ellendale, Royal Center, and St. Louis. In the case of Omaha, this may be due to the greater number of observations available. At Dallas it may be due to the fact that the station is in a relatively low latitude where the tropopause is relatively high.

The extreme temperatures (figs. 2–8) for the year at the seven stations are plotted on the same graph with the seasonal mean temperatures. The extremes for Omaha, Ellendale, and Dallas are considered representative, but those above 5 km at Groesbeck and Broken Arrow are deemed to be somewhat less so. The minima at Broken Arrow are representative but the maxima are omitted above 4 km.

Extreme temperatures for the other stations, generally up to 5 km, are given in the tabular data.

The minimum pressure curves (fig. 23) were derived so as to show a lower pressure at each given altitude than

[9] W. J. Humphreys, Physics of the Air, 2d edition, 1929, p. 77.

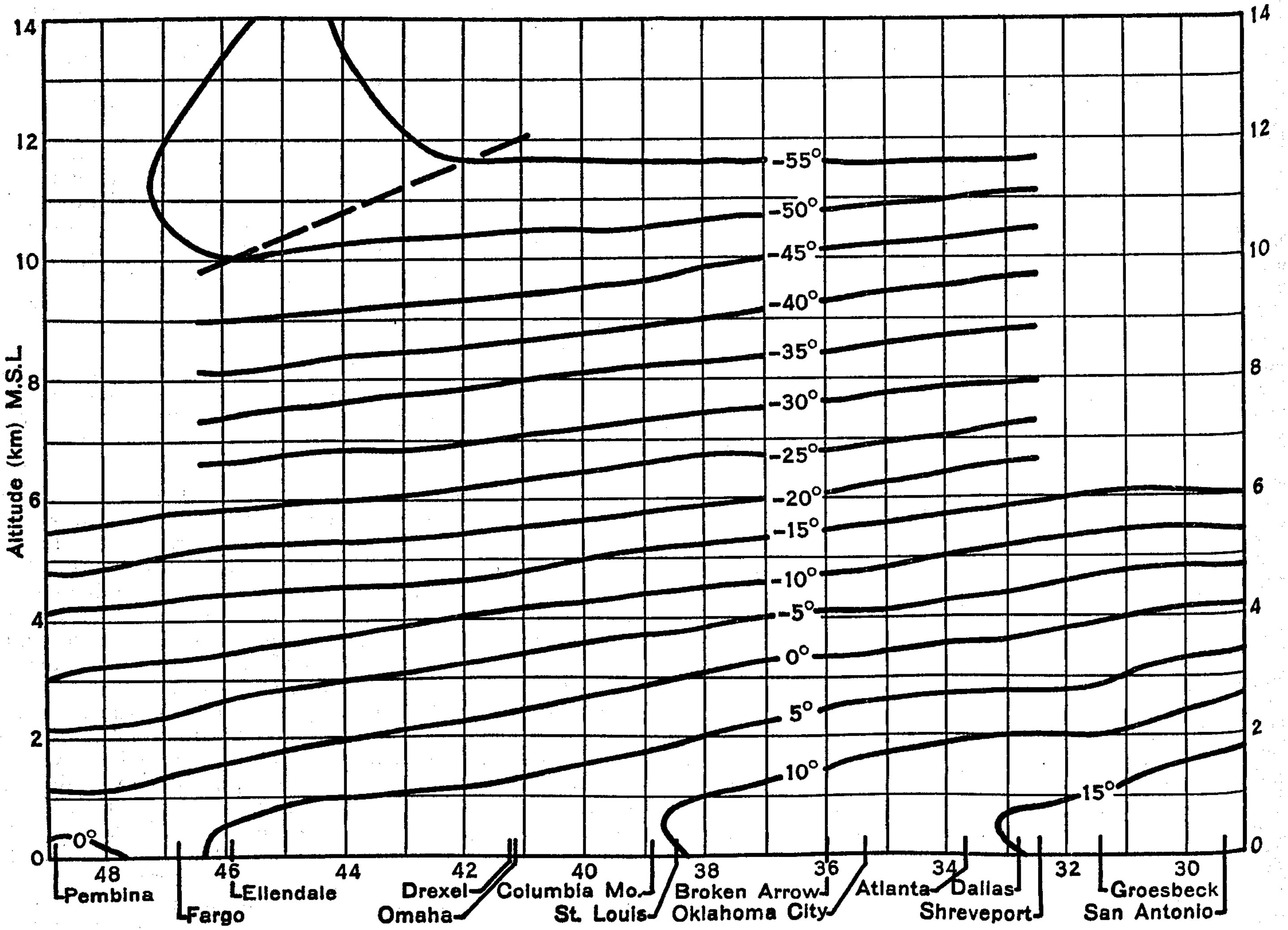

FIGURE 24.—Spring mean temperatures in a longitudinal section of the atmosphere.

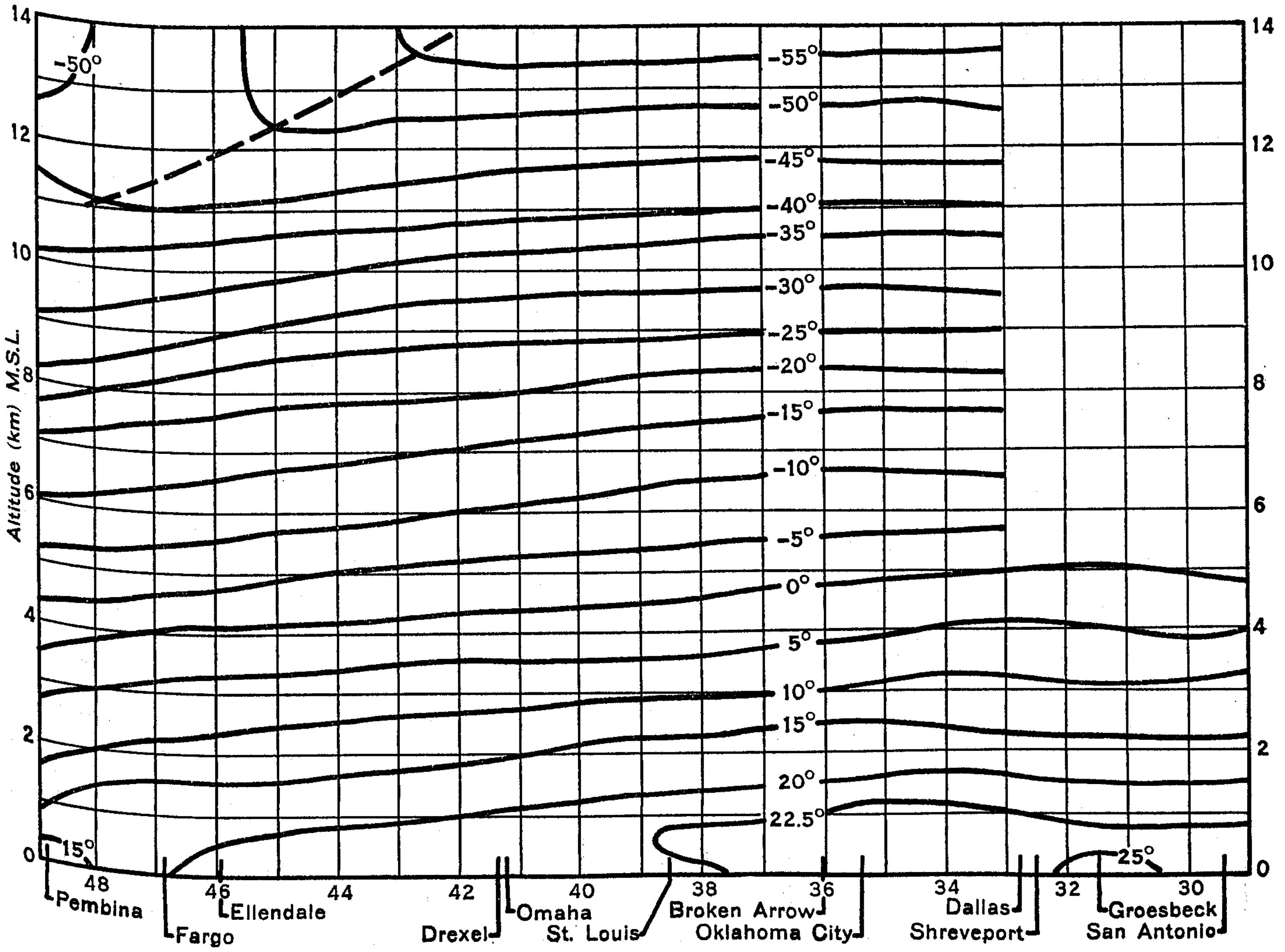

FIGURE 25.—Summer mean temperatures in a longitudinal section of the atmosphere.

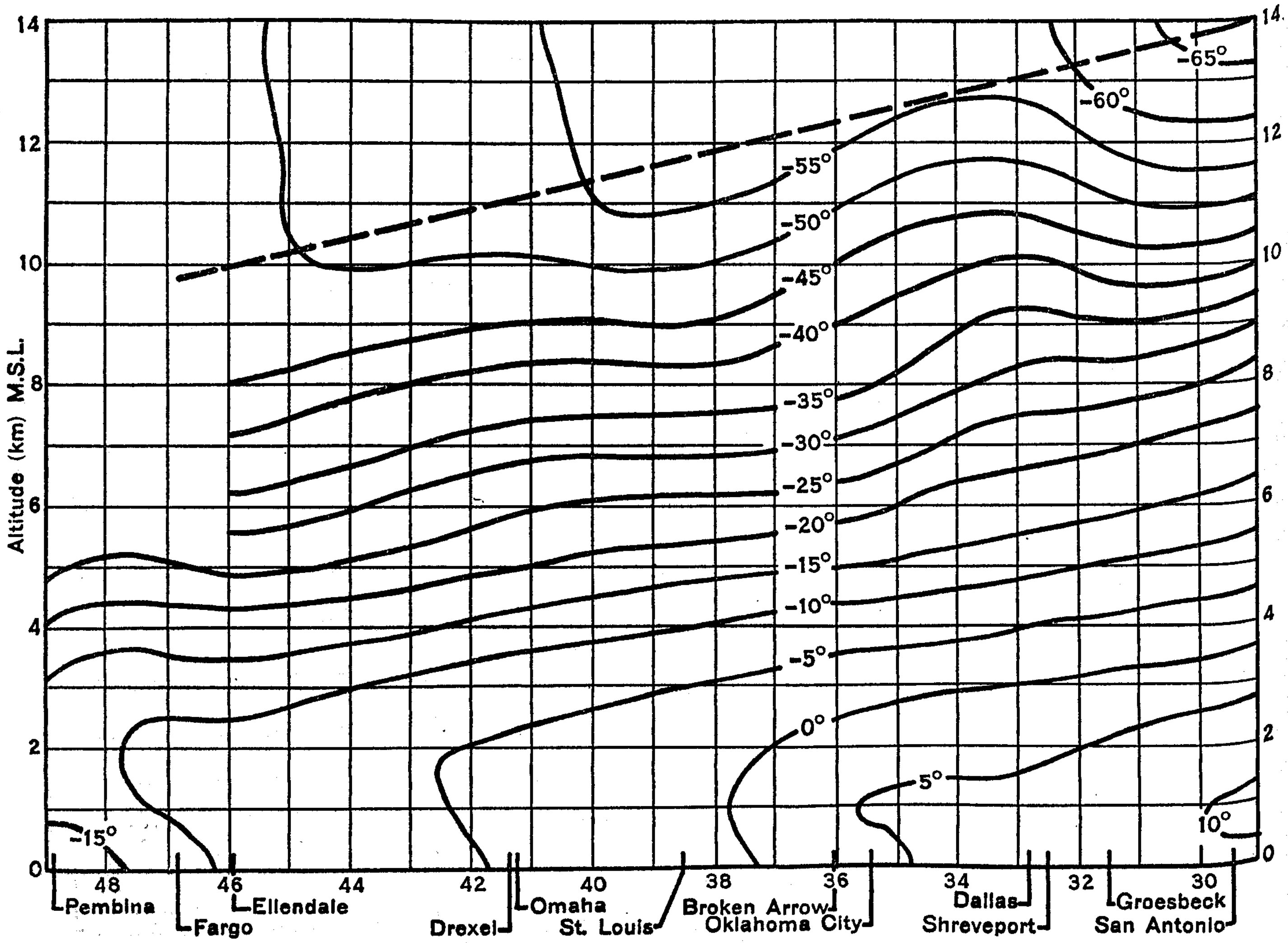

FIGURE 26.—Autumn mean temperatures in a longitudinal section of the atmosphere.

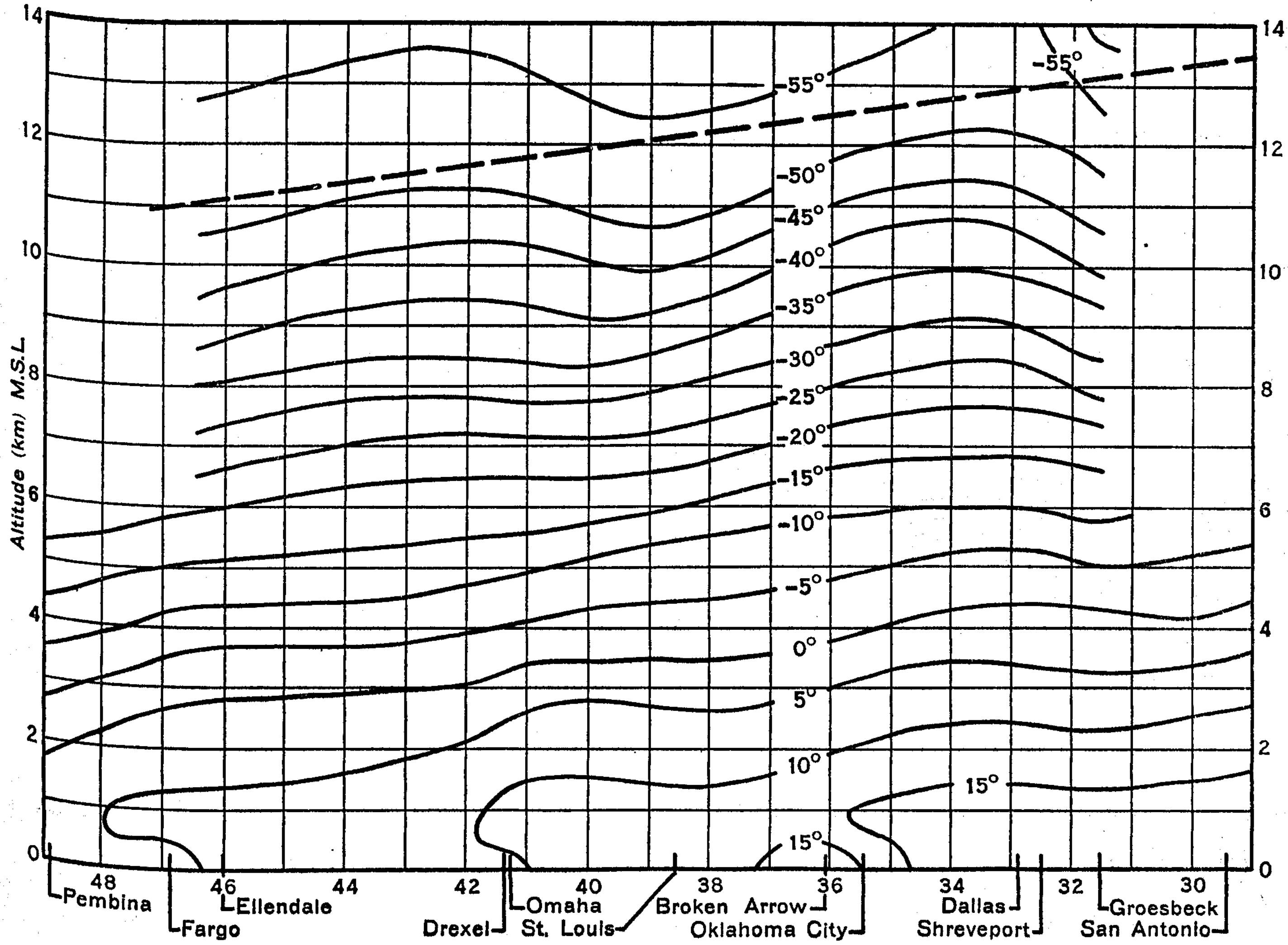

FIGURE 27.—Winter mean temperatures in a longitudinal section of the atmosphere.

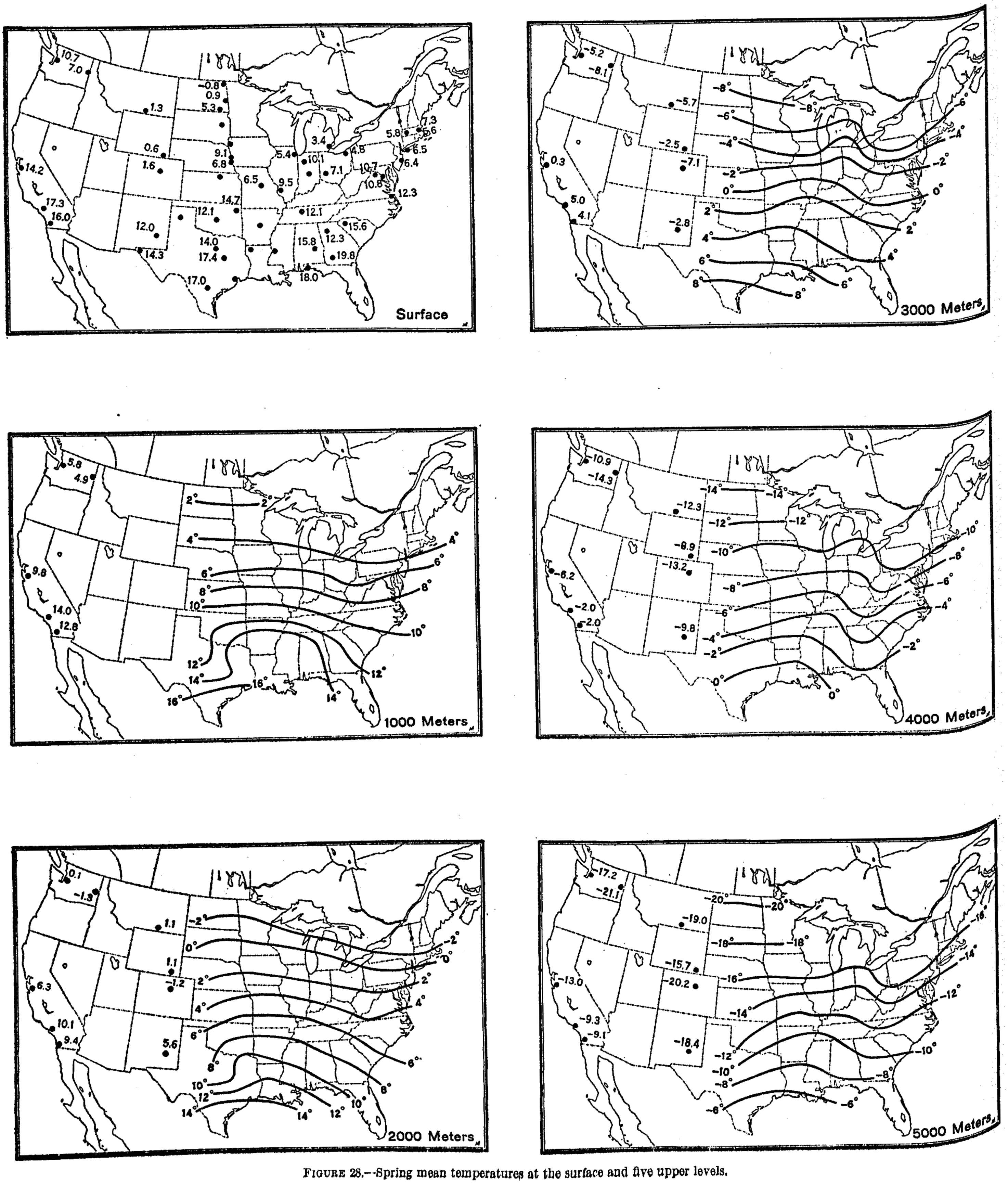

FIGURE 28.--Spring mean temperatures at the surface and five upper levels.

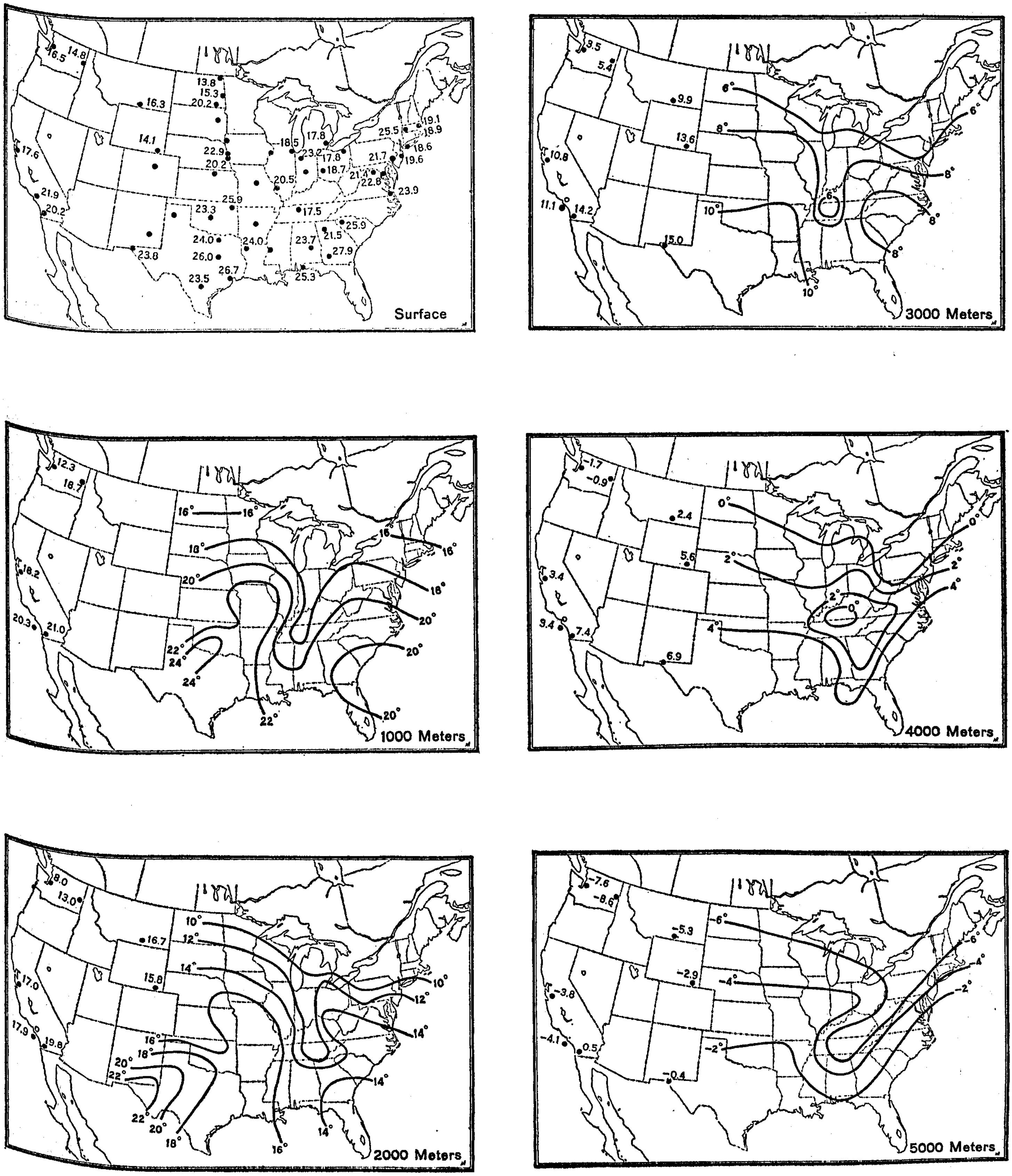

FIGURE 29.—Summer mean temperatures at the surface and five upper levels.

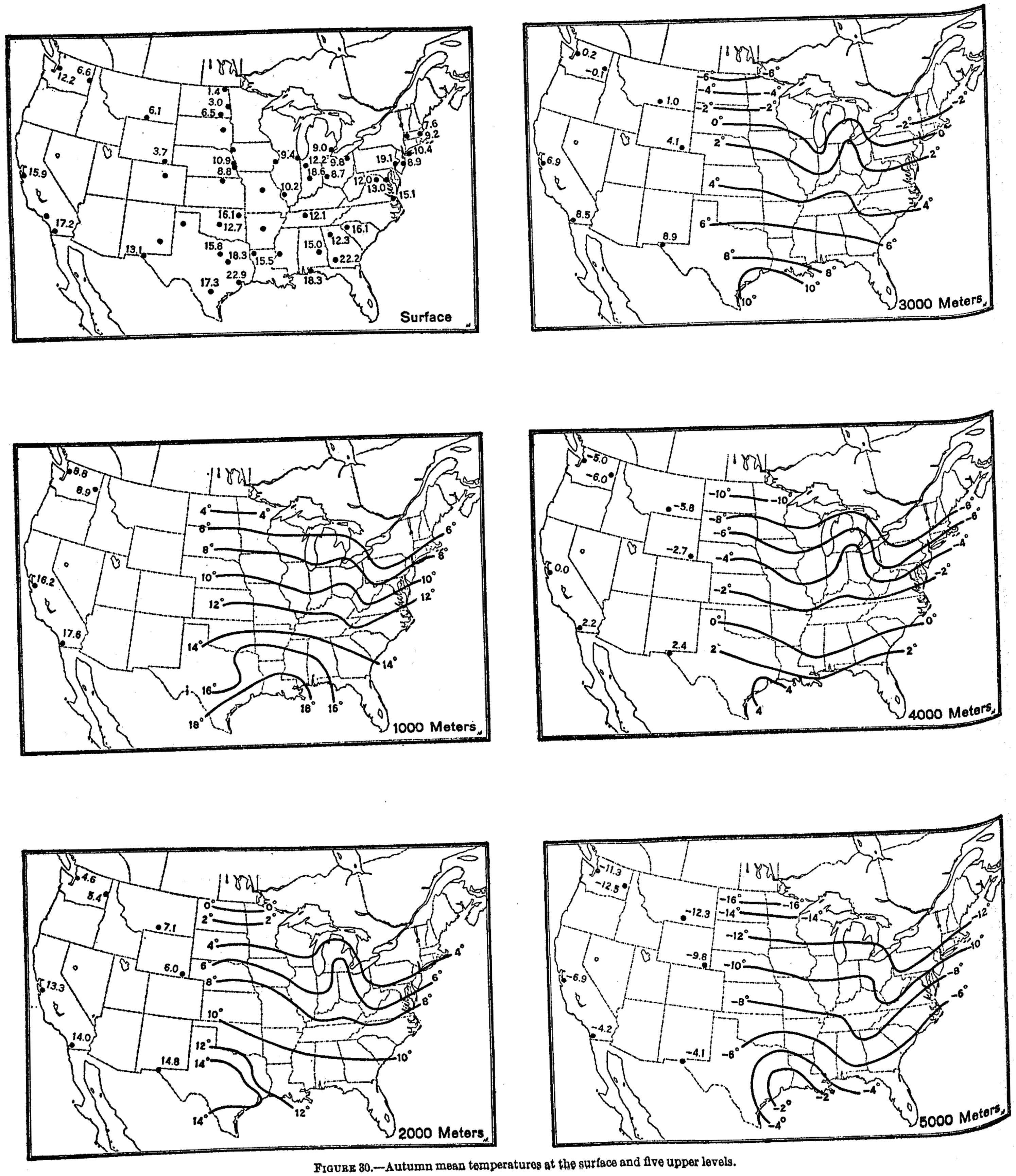

FIGURE 30.—Autumn mean temperatures at the surface and five upper levels.

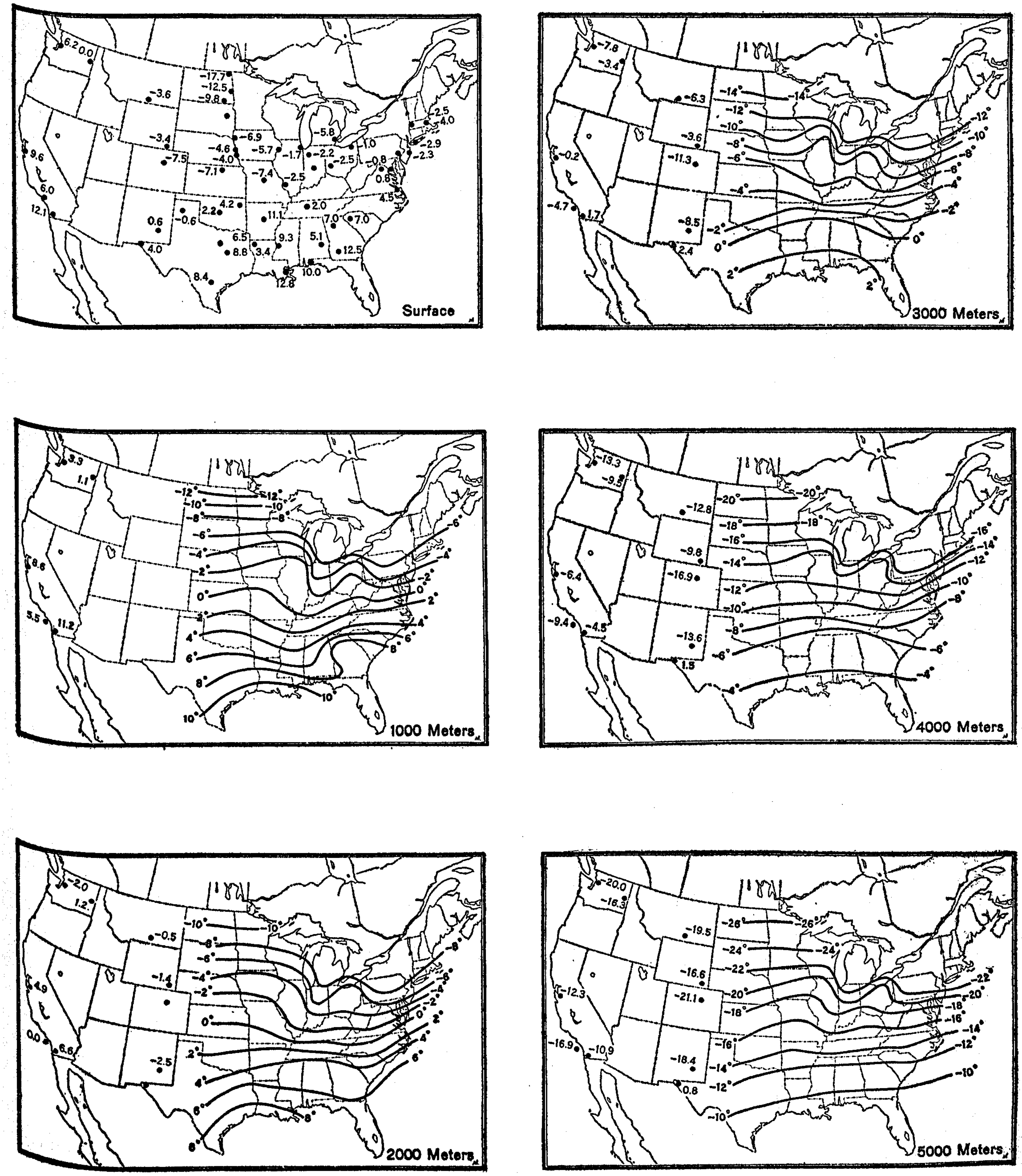

FIGURE 31.—Winter mean temperatures at the surface and five upper levels.

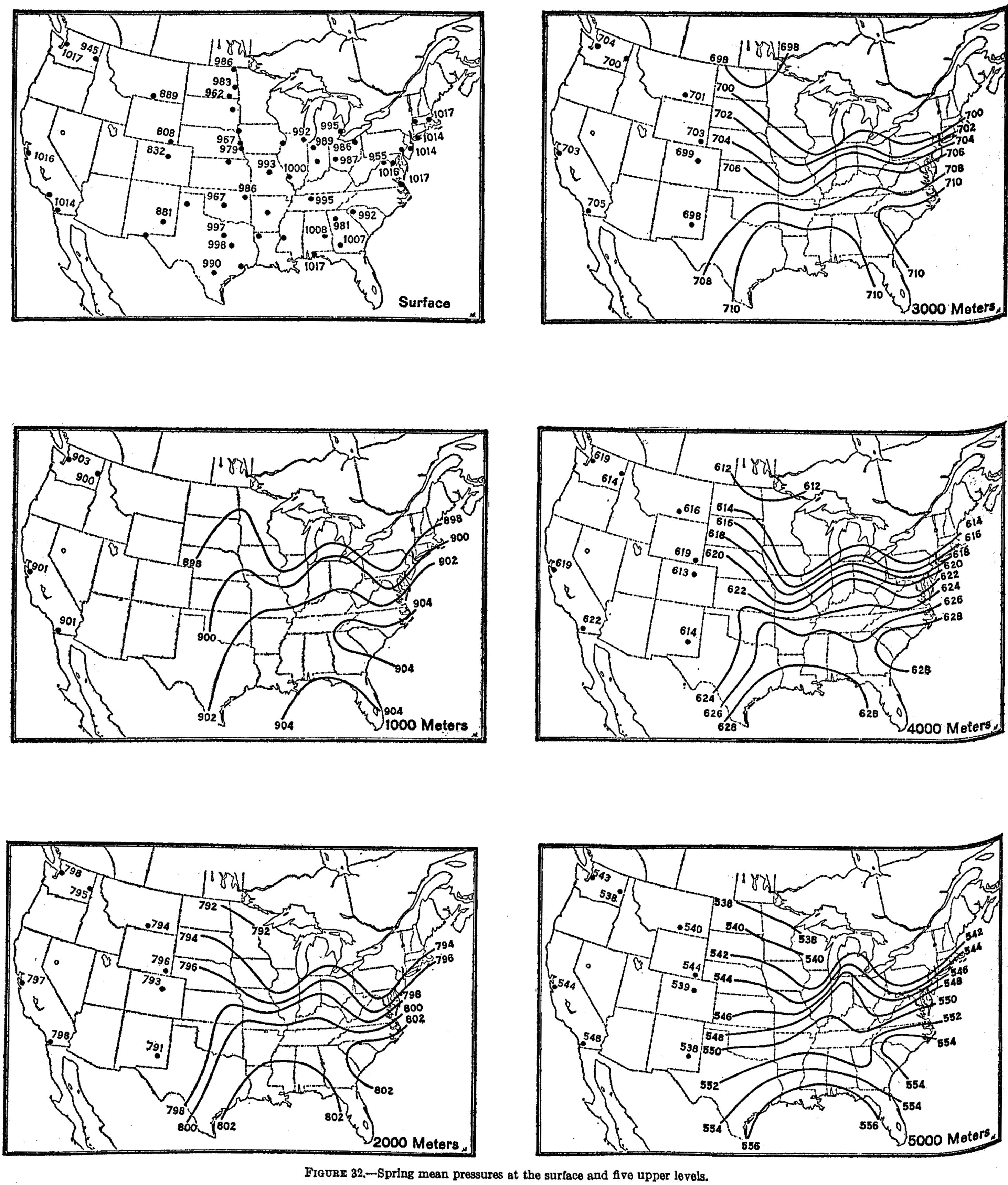

FIGURE 32.—Spring mean pressures at the surface and five upper levels.

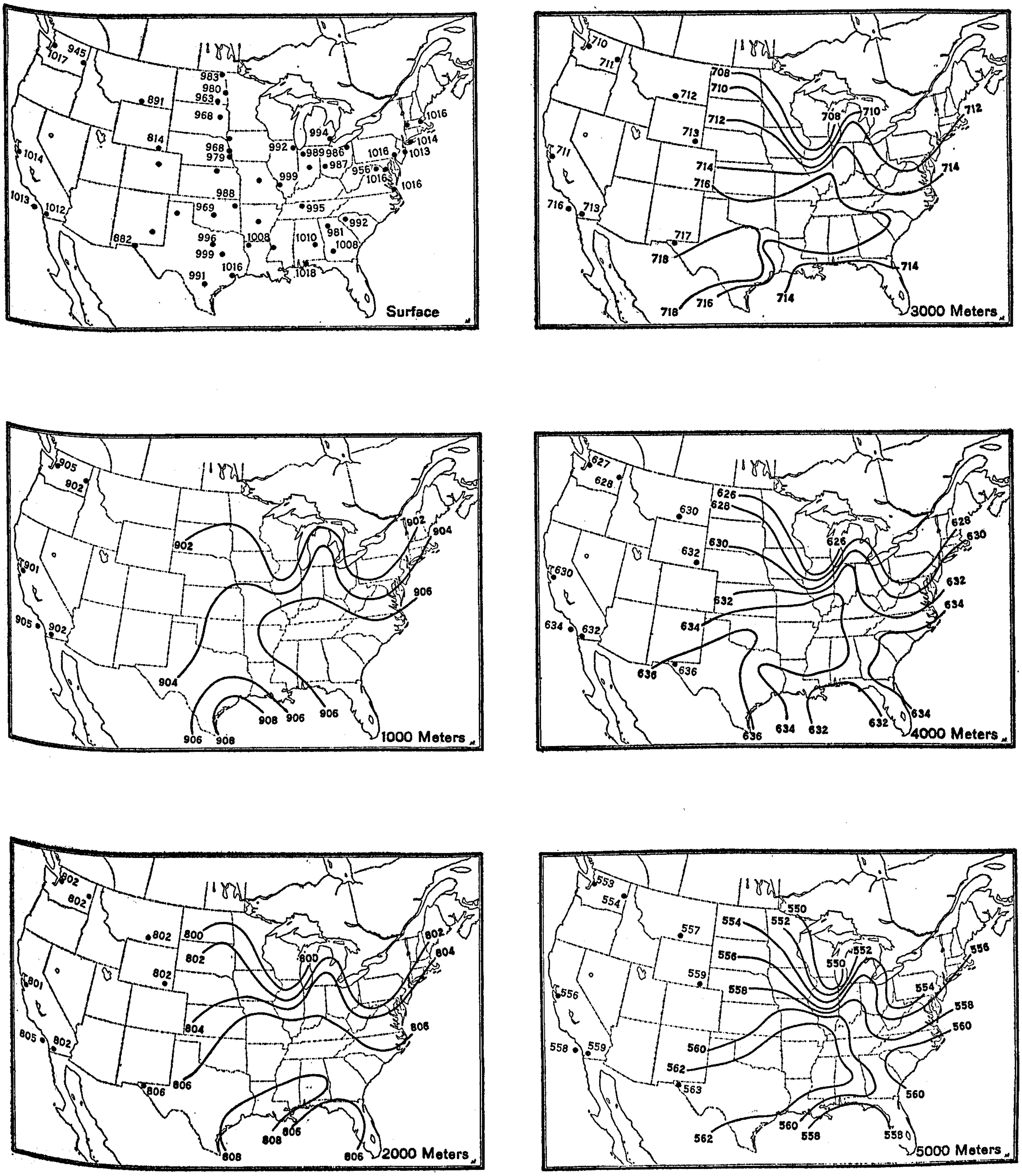

FIGURE 33.—Summer mean pressures at the surface and five upper levels.

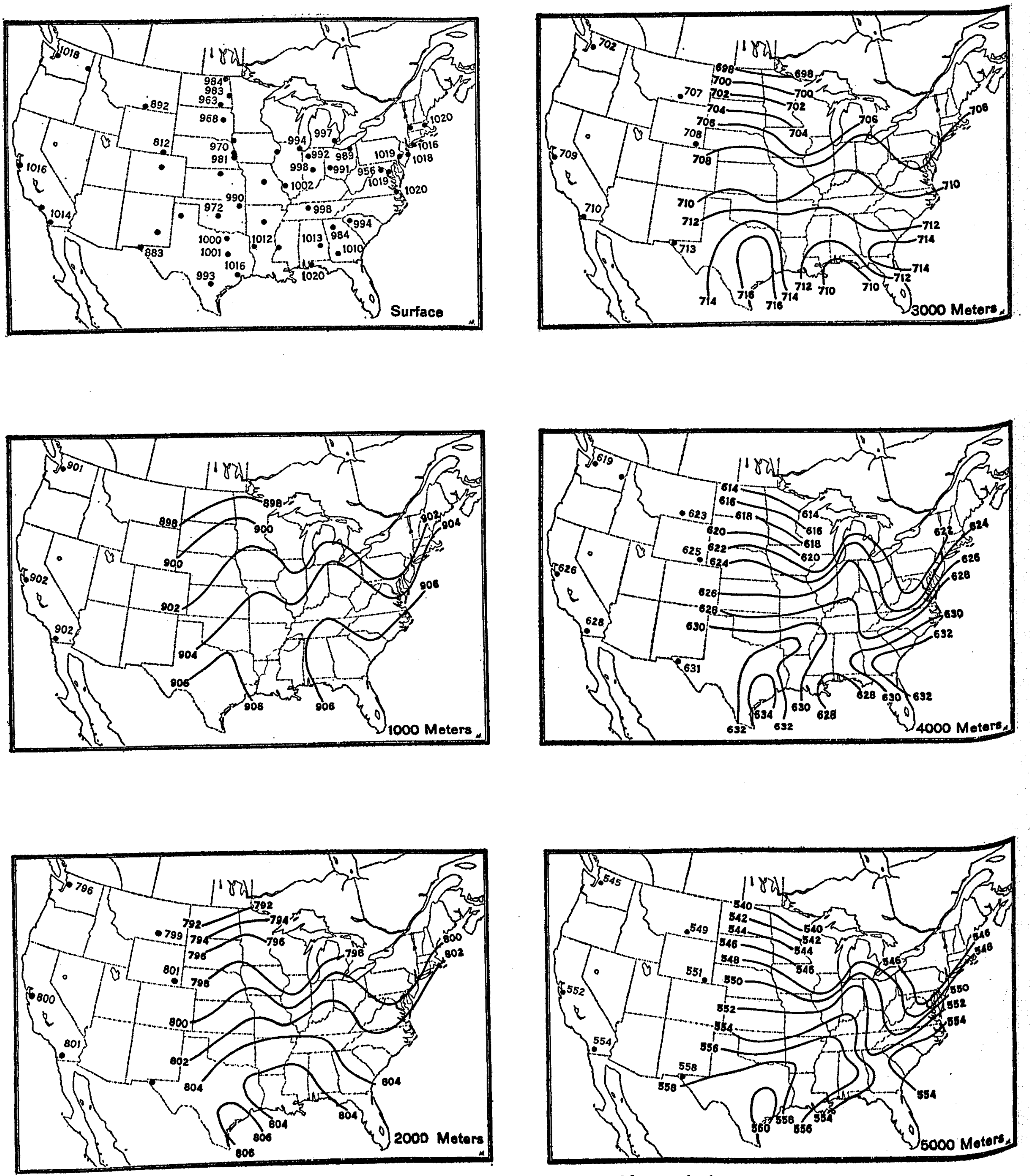

FIGURE 34.—Autumn mean pressures at the surface and five upper levels.

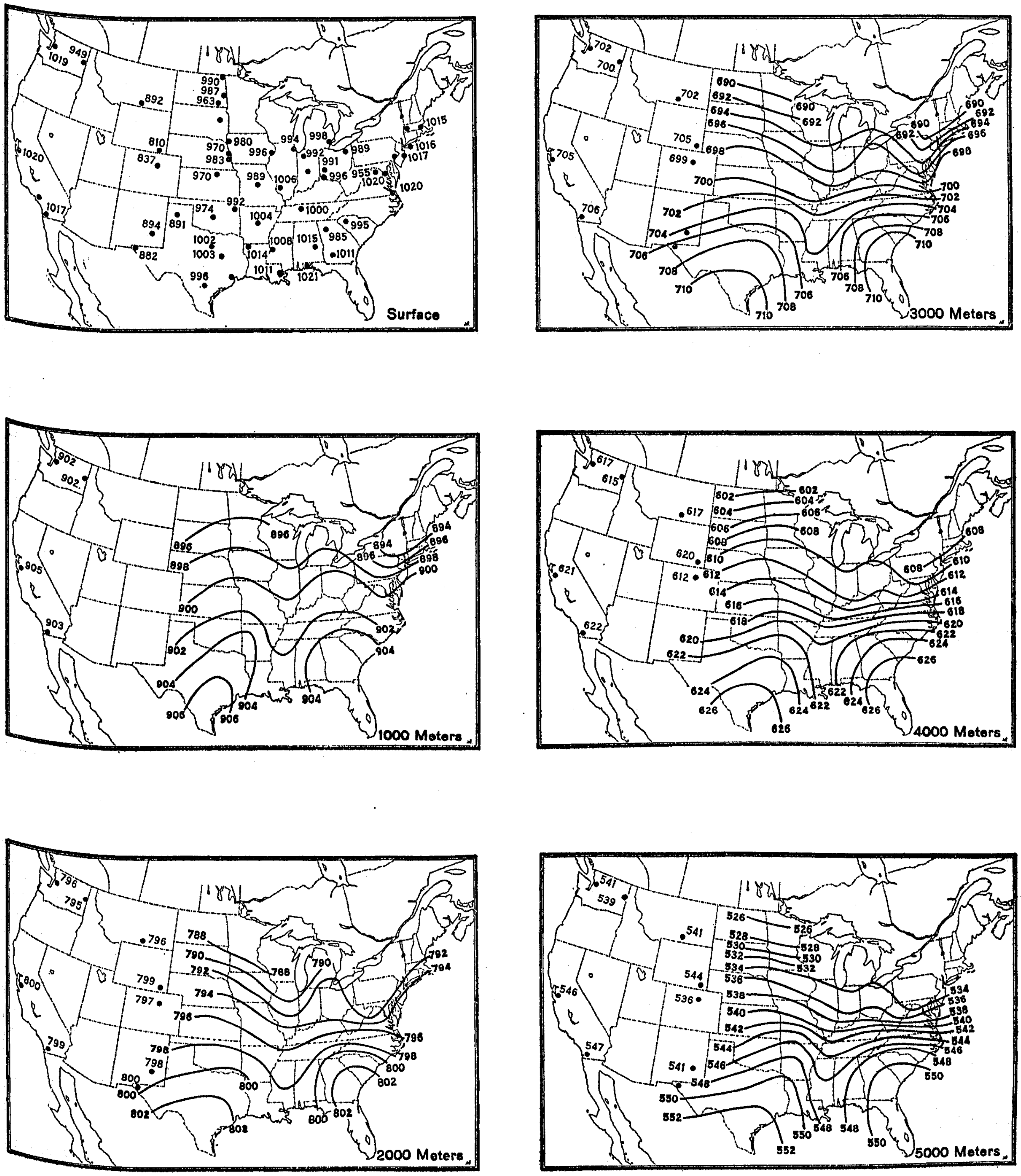

FIGURE 35.—Winter mean pressures at the surface and five upper levels.

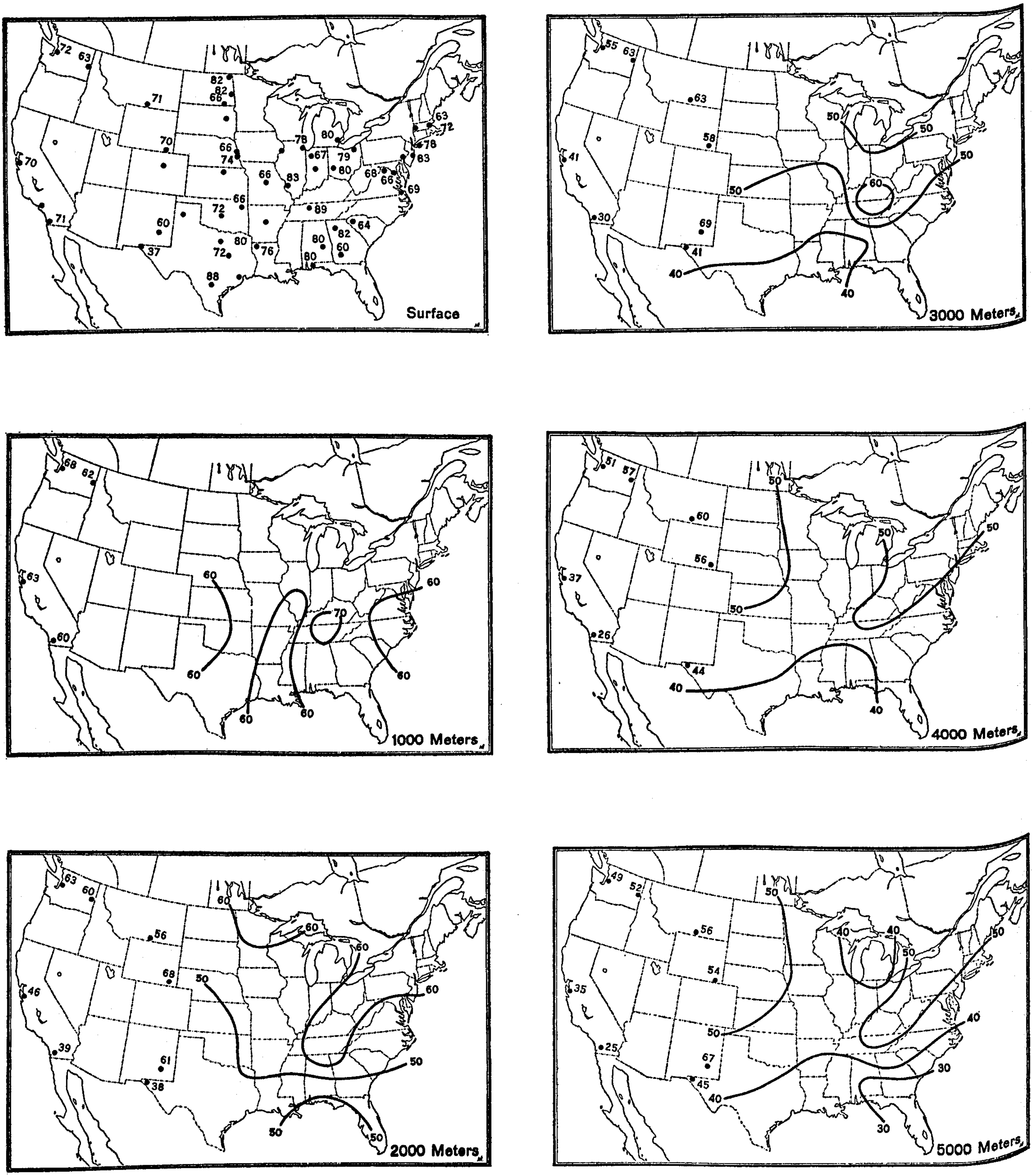

FIGURE 36.—Spring mean relative humidities at the surface and five upper levels.

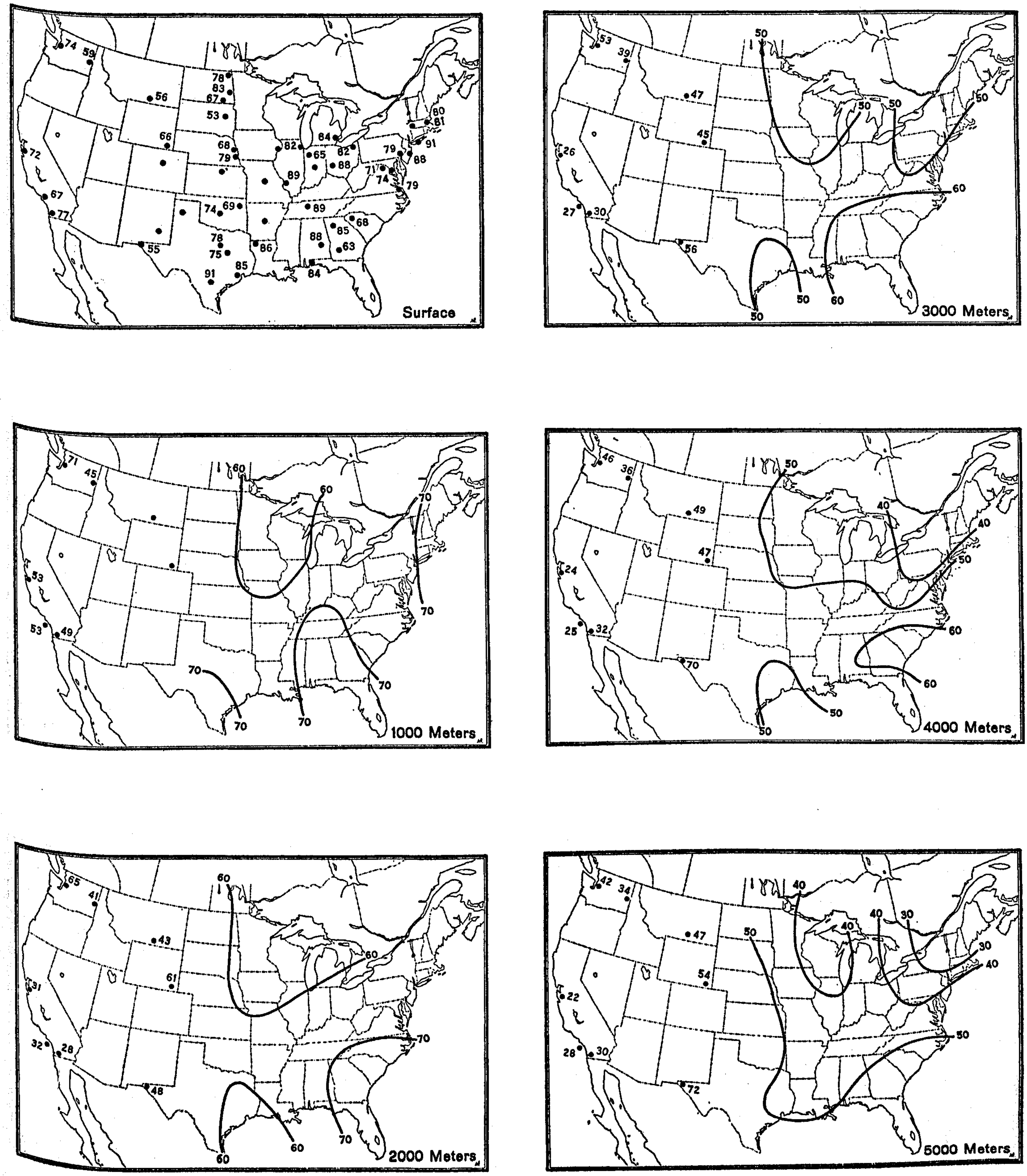

FIGURE 37.—Summer mean relative humidities at the surface and five upper levels.

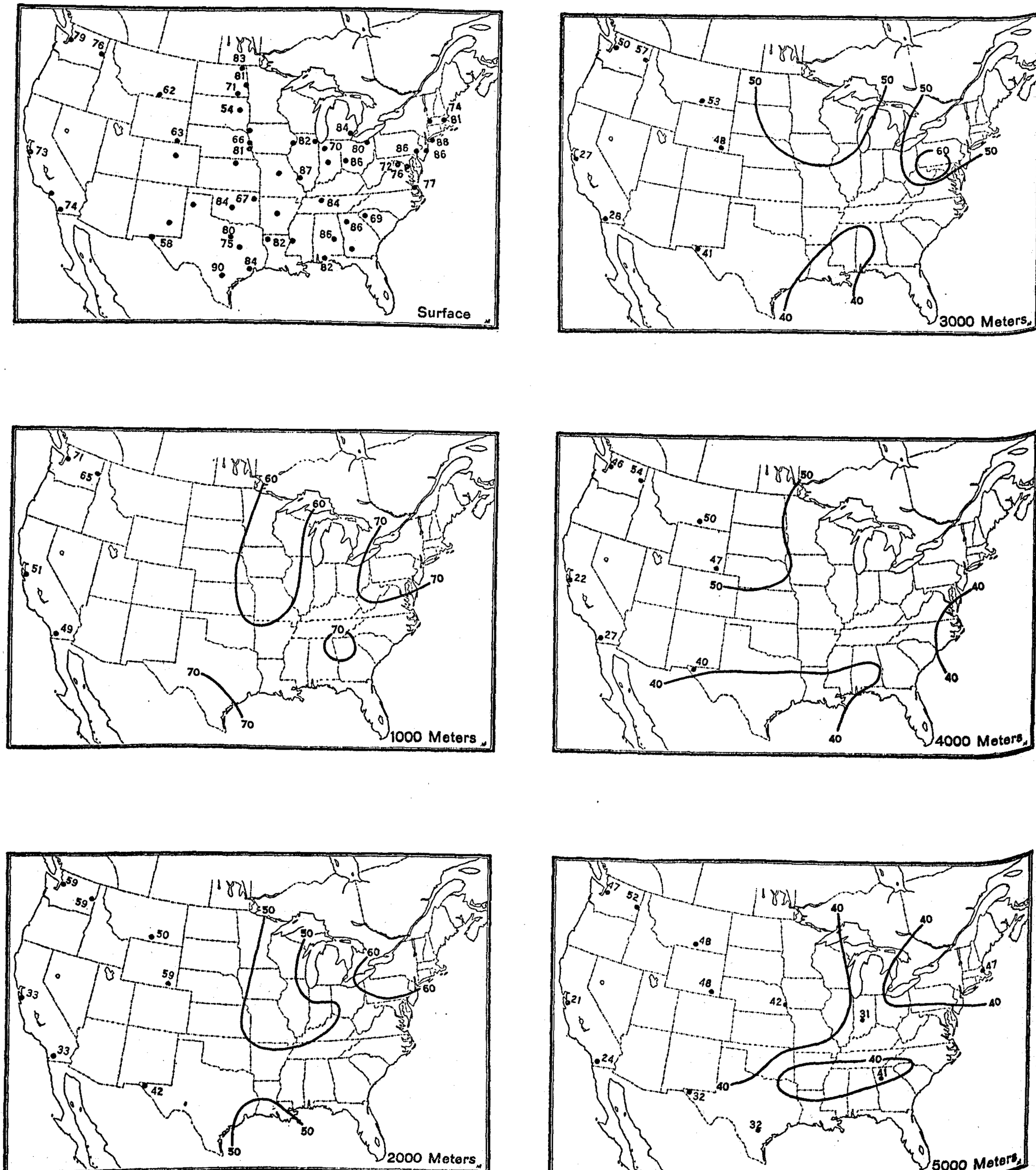

FIGURE 38.—Autumn mean relative humidities at the surface and five upper levels.

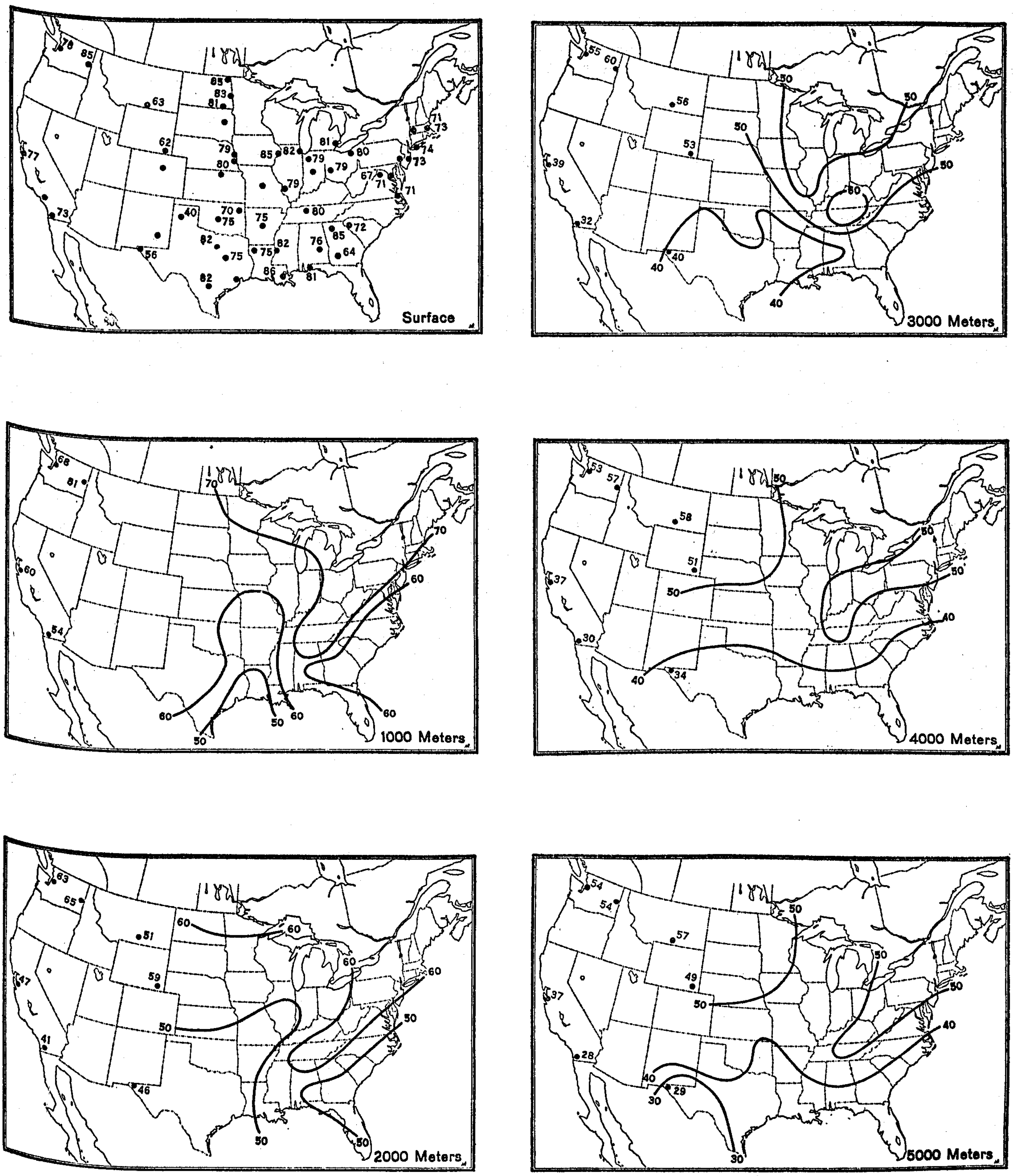

FIGURE 39.—Winter mean relative humidities at the surface and five upper levels.

can reasonably be expected to actually exist. It should be noted that the lower sea-level pressure does not necessarily yield the lower pressure at high altitudes, since the two theoretical curves intersect at about 5½ km, and above this level the lower pressure is shown by the curve corresponding to the higher surface pressure and lower surface temperature.

CONCLUSION

Because of the fact that this publication is mainly factual in scope, no attempt is made to generalize. Furthermore, it is felt that it should be made clear that, before any generalizations can be made, there must be records of 10 years or more in length from each station in a network at least as dense, and preferably more so, than the present one.

In the compilation of all the data presented herein the aid of many individuals was involved. Particular acknowledgement is due the cheerful help of Messrs. W. B. Drawbaugh, A. D. Hustead, and Carl Russo. Especial mention must also be made of L. P. Harrison for his invaluable suggestions and criticisms. Practically every member of the Aerological Division in the Central Office participated in this work to some extent.

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TABLE 2.—*Data for the 7 central stations*

BROKEN ARROW, OKLA.

SPRING

Altitude (km)	Temperature		Pressure		Humidity	Density		Lapse rate	Extremes				Number of observations	Altitude (km)	Temperature		Pressure		Humidity	Density		Lapse rate	Extremes				Number of observations
									Max.	Date	Min.	Date											Max.	Date	Min.	Date	
	°C.	°F.	mb.	Inches	Per cent	kg/m³	lbs./ft.³	°C./100m	°C.		°C.				°C.	°F.	mb.	Inches	Per cent	kg/m³	lbs./ft.³	°C./100m	°C.		°C.		
0.233	14.7		986.4		66								1,036	2½	3.8		753		48			0.54					609
½	13.0		955.5		64			0.64					1,036	3	0.9		708		47			.58					427
1	10.8		901		61			.44					1,025	4	−5.0		626		45			.59					116
1½	8.8		849		55			.40					943	5	−10.5				42			.55					20
2	6.5		800		50			.46					800	6	−16.2				32			.57					1

SUMMER

Altitude (km)	°C.	°F.	mb.	Inches	Per cent	kg/m³	lbs./ft.³	°C./100m	Max.	Date	Min.	Date	Number of observations	Altitude (km)	°C.	°F.	mb.	Inches	Per cent	kg/m³	lbs./ft.³	°C./100m	Max.	Date	Min.	Date	Number of observations
0.233	25.9		988.2		69								853	2½	12.7		760		59			0.62					492
½	24.3		958.5		67			0.60					853	3	9.6		716		58			.62					337
1	21.8		905		64			.50					843	4	3.5		635		54			.61					80
1½	18.8		854		63			.60					757	5	−2.2				51			.57					11
2	15.8		806		61			.60					629														

AUTUMN

Altitude (km)	°C.	°F.	mb.	Inches	Per cent	kg/m³	lbs./ft.³	°C./100m	Max.	Date	Min.	Date	Number of observations	Altitude (km)	°C.	°F.	mb.	Inches	Per cent	kg/m³	lbs./ft.³	°C./100m	Max.	Date	Min.	Date	Number of observations
0.233	16.1		990.1		67								925	2½	6.7		755		48			0.50					546
½	15.0		959.3		64			0.41					925	3	4.0		710		46			.54					372
1	13.2		904		60			.36					907	4	−1.5		627		41			.55					96
1½	11.4		852		56			.36					818	5	−6.8		553		35			.53					9
2	9.2		802		51			.44					686	6	−12.3				34			.55					1

WINTER

Altitude (km)	Temperature		Pressure		Humidity	Density		Lapse rate	Extremes				Number of observations
									Max.	Date	Min.	Date	
	°C.	°F.	mb.	Inches	Percent	kg/m³	lbs./ft.³	°C./100m	°C.		°C.		
0.233	4.2	39.6	991.5	29.28	70	1.243	0.0776						954
½	3.6	38.5	959.5	28.33	65	1.206	0.0753	0.22					953
1	3.1	37.6	903	26.67	56	1.137	.0710	.10	30.6	Aug. 1, 1923	−21.2	Dec. 31, 1927	929
1½	2.4	36.3	849	25.07	48	1.072	.0669	.14					817
2	.9	33.6	798	23.56	43	1.014	.0633	.30	25.4	{June 18, 1924 June 19, 1924}	−17.2	Dec. 19, 1929	681
2½	−1.3	29.7	750	22.15	41	.960	.0599	.44					529
3	−3.8	25.2	704	20.79	40	.910	.0568	.50	16.6	{Aug. 2, 1924 June 30, 1928}	−20.1	Dec. 19, 1929	356
4	−9.2	15.4	620	18.31	40	.818	.0511	.54	9.2	{Sept. 17, 1925 July 2, 1928}	−25.9	Dec. 22, 1929	127
5	−15.1	4.8	545	16.09	39	.736	.0459	.59	−.4	July 19, 1924	−32.8	do	39
6	−21.8	−7.2	477	14.09	34	.661	.0413	.67			−38.2	do	24
7	−29.5	−21.1	416	12.28	33	.595	.0371	.77			−41.7	do	22
8	−36.8	−34.2	361	10.66	33	.533	.0333	.73			−46.8	do	21
9	−43.8	−46.8	313	9.24	33	.476	.0297	.70			−52.1	do	21
10	−49.5	−57.1	270	7.97	32	.421	.0263	.57			−56.8	Dec. 23, 1929	19
11	−53.5	−64.3	232	6.85	32	.368	.0230	.40			−62.1	Dec. 13, 1929	16
12	−55.4	−67.7	199	5.88	31	.319	.0199	.19			−72.5	do	15
13	−55.9	−68.6	171	5.05	30			.05					14
14	−58.1	−72.6	147	4.34	29			.22					14
15	−60.7	−77.3	126	3.72	29			.26					14
16	−62.9	−81.2	108	3.19	29			.22					11
17	−63.9	−83.0	93	2.75	29			.10					9
18	−64.3	−83.7	80	2.36	29			.04					8
19	−65.7	−86.3	69	2.04	29			.14					4
20	−64.9	−84.8	60	1.77	29			+.08					3
21	−64.7	−84.5	52	1.54	29			+.02					2
22	−62.8	−81.0	45	1.33	29			+.19					1

TABLE 2.—*Data for the 7 central stations*—Continued

DALLAS, TEX.

SPRING

Altitude (km)	Temperature °C.	Temperature °F.	Pressure mb	Pressure Inches	Humidity Percent	Density kg/m³	Density lbs./ft.³	Lapse rate °C./100m	Extremes Max. °C.	Date	Min. °C.	Date	Number of observations
0.149	14.0	57.2	997.1	29.44	80	1.204	0.0752	--------	----	-----	----	-----	281
½	15.4	59.7	957.8	28.28	69	1.151	.0719	+0.40	----	-----	----	-----	281
1	14.5	58.1	902	26.64	62	1.088	.0679	.18	----	-----	----	-----	281
1½	12.8	55.0	851	25.13	56	1.033	.0645	.34	----	-----	----	-----	281
2	10.5	50.9	801	23.65	51	.981	.0612	.46	----	-----	----	-----	281
2½	7.8	46.0	754	22.27	47	.933	.0582	.54	----	-----	----	-----	281
3	4.8	40.6	710	20.97	45	.888	.0554	.60	----	-----	----	-----	280
4	−1.9	28.6	626	18.49	42	.803	.0501	.67	----	-----	----	-----	280
5	−9.2	15.4	552	16.30	39	.728	.0454	.73	----	-----	----	-----	274
6	−16.8	1.8	485	14.32	34	.659	.0411	.76	----	-----	----	-----	12
7	−23.5	−10.3	426	12.58	28	.595	.0371	.67	----	-----	----	-----	7
8	−30.4	−22.7	371	10.96	27	.533	.0333	.69	----	-----	----	-----	7
9	−36.9	−34.4	323	9.54	25	.477	.0298	.65	----	-----	----	-----	6

Altitude (km)	Temperature °C.	Temperature °F.	Pressure mb	Pressure Inches	Humidity Percent	Density kg/m³	Density lbs./ft.³	Lapse rate °C./100m	Extremes Max. °C.	Date	Min. °C.	Date	Number of observations
10	−43.5	−46.3	279	8.24	24	0.424	0.0265	0.66	----	-----	----	-----	6
11	−50.2	−58.4	241	7.12	24	.377	.0235	.67	----	-----	----	-----	6
12	−56.0	−68.8	207	6.11	24	.332	.0207	.58	----	-----	----	-----	6
13	−56.8	−70.2	177	5.23	23	------	-------	.08	----	-----	----	-----	6
14	−58.2	−72.8	152	4.49	23	------	-------	.14	----	-----	----	-----	6
15	−60.9	−77.6	130	3.84	22	------	-------	.27	----	-----	----	-----	6
16	−62.1	−79.8	110	3.25	21	------	-------	.12	----	-----	----	-----	6
17	−63.4	−82.1	94	2.78	21	------	-------	.13	----	-----	----	-----	5
18	−63.9	−83.0	80	2.36	21	------	-------	.05	----	-----	----	-----	4
19	−65.1	−85.2	68	2.01	21	------	-------	.12	----	-----	----	-----	4
20	−60.1	−76.2	58	1.71	21	------	-------	+.50	----	-----	----	-----	1
21	−54.9	−66.8	48	1.42	21	------	-------	+.52	----	-----	----	-----	1

SUMMER

Altitude (km)	Temperature °C.	Temperature °F.	Pressure mb	Pressure Inches	Humidity Percent	Density kg/m³	Density lbs./ft.³	Lapse rate °C./100m	Extremes Max. °C.	Date	Min. °C.	Date	Number of observations
0.149	24.0	75.2	996.5	29.43	78	1.158	0.0723	--------	----	-----	----	-----	275
½	25.2	77.4	959.0	28.32	70	1.110	.0693	+0.34	----	-----	----	-----	275
1	23.6	74.5	905	26.72	65	1.054	.0658	.32	----	-----	----	-----	275
1½	20.7	69.3	855	25.25	65	1.007	.0629	.58	----	-----	----	-----	275
2	17.6	63.7	807	23.83	64	.961	.0600	.62	----	-----	----	-----	275
2½	14.6	58.3	761	22.47	60	.917	.0572	.60	----	-----	----	-----	275
3	11.7	53.1	718	21.20	56	.875	.0546	.58	----	-----	----	-----	273
4	5.6	42.1	635	18.75	53	.792	.0494	.61	----	-----	----	-----	273
5	−.6	30.9	562	16.60	51	.717	.0448	.62	----	-----	----	-----	262
6	−6.7	19.9	496	14.65	48	.648	.0405	.61	----	-----	----	-----	18
7	−12.4	9.7	436	12.88	45	.582	.0363	.57	----	-----	----	-----	7
8	−19.3	−2.7	382	11.28	43	.524	.0327	.69	----	-----	----	-----	7

Altitude (km)	Temperature °C.	Temperature °F.	Pressure mb	Pressure Inches	Humidity Percent	Density kg/m³	Density lbs./ft.³	Lapse rate °C./100m	Extremes Max. °C.	Date	Min. °C.	Date	Number of observations
9	−26.0	−14.8	333	9.83	42	0.470	0.0293	0.67	----	-----	----	-----	7
10	−32.8	−27.0	289	8.53	40	.419	.0262	.68	----	-----	----	-----	7
11	−40.1	−40.2	251	7.41	39	.375	.0234	.73	----	-----	----	-----	7
12	−46.9	−52.4	217	6.41	39	.334	.0209	.68	----	-----	----	-----	7
13	−52.4	−62.3	187	5.52	38	------	-------	.55	----	-----	----	-----	6
14	−57.6	−71.7	160	4.72	36	------	-------	.52	----	-----	----	-----	4
15	−60.6	−77.1	136	4.02	35	------	-------	.30	----	-----	----	-----	4
16	−62.2	−80.0	116	3.43	34	------	-------	.16	----	-----	----	-----	4
17	−64.3	−83.7	98	2.89	34	------	-------	.21	----	-----	----	-----	3
18	−63.7	−82.7	84	2.48	34	------	-------	+.05	----	-----	----	-----	3
19	−63.0	−81.4	71	2.10	-----	------	-------	+.07	----	-----	----	-----	2

AUTUMN

Altitude (km)	Temperature °C.	Temperature °F.	Pressure mb	Pressure Inches	Humidity Percent	Density kg/m³	Density lbs./ft.³	Lapse rate °C./100m	Extremes Max. °C.	Date	Min. °C.	Date	Number of observations
0.149	15.8	60.4	1,000.1	29.53	80	1.200	0.0749	--------	----	-----	----	-----	280
½	18.0	64.4	960.9	28.38	67	1.144	.0714	+0.63	----	-----	----	-----	280
1	17.1	62.8	906	26.75	61	1.082	.0675	.18	----	-----	----	-----	280
1½	15.1	59.2	854	25.22	59	1.028	.0642	.40	----	-----	----	-----	280
2	12.7	54.9	805	23.36	57	.978	.0611	.48	----	-----	----	-----	280
2½	10.2	50.4	759	22.00	52	.931	.0581	.50	----	-----	----	-----	280
3	7.7	45.9	716	20.73	48	.886	.0553	.50	----	-----	----	-----	280
4	2.0	35.6	633	18.28	44	.800	.0499	.57	----	-----	----	-----	278
5	−3.9	25.0	559	16.09	40	.723	.0451	.59	----	-----	----	-----	271
6	−10.2	13.6	492	14.12	44	.652	.0407	.63	----	-----	----	-----	11
7	−16.5	2.3	431	12.31	41	.585	.0365	.63	----	-----	----	-----	9
8	−22.6	−8.7	377	10.72	39	.524	.0327	.61	----	-----	----	-----	9
9	−29.2	−20.6	328	9.27	38	.469	.0293	.66	----	-----	----	-----	9
10	−35.9	−32.6	284	7.97	37	.417	.0260	.67	----	-----	----	-----	9
11	−41.6	−42.9	246	6.85	36	.370	.0231	.57	----	-----	----	-----	9

Altitude (km)	Temperature °C.	Temperature °F.	Pressure mb	Pressure Inches	Humidity Percent	Density kg/m³	Density lbs./ft.³	Lapse rate °C./100m	Extremes Max. °C.	Date	Min. °C.	Date	Number of observations
12	−46.3	−51.3	212	5.85	35	0.326	0.204	0.47	----	-----	----	-----	9
13	−50.2	−58.4	182	4.96	35	------	-------	.39	----	-----	----	-----	9
14	−53.5	−64.3	156	4.19	35	------	-------	.33	----	-----	----	-----	9
15	−57.3	−71.1	133	3.51	35	------	-------	.38	----	-----	----	-----	8
16	−59.0	−74.2	113	2.92	36	------	-------	.17	----	-----	----	-----	8
17	−60.9	−77.6	97	2.45	36	------	-------	.19	----	-----	----	-----	6
18	−60.3	−76.5	83	2.04	36	------	-------	+.06	----	-----	----	-----	6
19	−56.6	−69.9	71	1.68	36	------	-------	+.37	----	-----	----	-----	5
20	−52.0	−61.6	60	1.36	36	------	-------	+.46	----	-----	----	-----	3
21	−46.7	−52.1	52	1.12	36	------	-------	+.53	----	-----	----	-----	2
22	−42.1	−43.8	44	.89	37	------	-------	+.46	----	-----	----	-----	1
23	−35.3	−31.5	37	.68	37	------	-------	+.68	----	-----	----	-----	1
24	−34.3	−29.7	31	.50	34	------	-------	+.10	----	-----	----	-----	1
25	−28.7	−19.7	27	.38	31	------	-------	+.56	----	-----	----	-----	1

WINTER

Altitude (km)	Temperature °C.	Temperature °F.	Pressure mb	Pressure Inches	Humidity Percent	Density kg/m³	Density lbs/ft³	Lapse rate °C./100m	Extremes Max. °C.	Date	Min. °C.	Date	Number of observations
0.149	6.5	43.7	1,001.7	29.58	82	1.245	0.0777	--------	--------	----------	--------	----------	276
½	8.3	46.9	960.9	28.38	71	1.186	.0740	+0.51	--------	----------	--------	----------	276
1	8.6	47.5	904	26.70	62	1.115	.0696	+.06	31.8	July 12, 1933	−21.1	Feb. 8, 1933	276
1½	8.0	46.4	851	25.13	54	1.052	.0657	.12	--------	----------	--------	----------	276
2	6.6	43.9	800	23.62	48	.994	.0621	.28	24.4	July 12, 1933	−18.0	Feb. 8, 1933	276
2½	4.3	39.7	752	22.21	44	.943	.0589	.46	--------	----------	--------	----------	275
3	1.8	35.2	707	20.91	41	.896	.0559	.50	18.0	Aug. 28, 1931	−22.1	Feb. 8, 1933	274
4	−4.2	24.4	623	18.43	36	.808	.0504	.60	11.7	Sept. 15, 1933	−27.1	do	271
5	−11.3	11.7	548	16.21	35	.730	.0456	.71	5.3	do	−28.6	Dec. 31, 1932	251
6	−16.8	−1.8	480	14.20	30	.654	.0408	.55	−3.3	Aug. 10, 1933	−26.6	Nov. 24, 1932	8
7	−21.6	−6.9	421	12.46	24	.585	.0365	.48	−8.2	do	−31.1	do	7
8	−26.9	−16.4	367	10.87	24	.521	.0325	.53	−12.7	do	−35.7	do	7
9	−33.4	−28.1	320	9.48	24	.467	.0292	.65	−18.5	do	−41.2	do	7
10	−39.9	−39.8	277	8.21	23	.416	.0260	.65	−23.8	Sept. 29, 1932	−45.6	do	7
11	−46.3	−51.3	239	7.09	23	.369	.0230	.64	−27.7	Dec. 11, 1932	−52.1	Mar. 9, 1933	7
12	−51.4	−60.5	206	6.11	23	.326	.0204	.51	−31.6	Dec. 15, 1932	−59.0	Jan. 26, 1933	7
13	−55.1	−67.2	177	5.26	22	--------	--------	.37	--------	----------	--------	----------	7
14	−55.3	−67.5	152	4.51	22	--------	--------	.02	--------	----------	--------	----------	7
15	−56.7	−70.1	130	3.87	22	--------	--------	.14	--------	----------	--------	----------	7
16	−57.9	−72.2	111	3.31	22	--------	--------	.12	--------	----------	--------	----------	7
17	−58.9	−74.0	96	2.86	22	--------	--------	.10	--------	----------	--------	----------	7
18	−60.1	−76.2	82	2.45	22	--------	--------	.12	--------	----------	--------	----------	5
19	−59.7	−75.5	71	2.13	22	--------	--------	+.04	--------	----------	--------	----------	4
20	−59.9	−75.8	61	1.83	22	--------	--------	.02	--------	----------	--------	----------	3
21	−59.3	−74.7	52	1.57	22	--------	--------	+.06	--------	----------	--------	----------	1
22	−58.3	−72.9	45	1.36	21	--------	--------	+.10	--------	----------	--------	----------	1
23	−57.2	−71.0	39	1.18	21	--------	--------	+.11	--------	----------	--------	----------	1
24	−55.9	−68.6	--------	--------	21	--------	--------	+.13	--------	----------	--------	----------	1
25	−54.7	−66.5	--------	--------	21	--------	--------	+.12	--------	----------	--------	----------	1
26	−53.6	−64.5	--------	--------	21	--------	--------	+.11	--------	----------	--------	----------	1

TABLE 2.—*Data for the 7 central stations*—Continued

ELLENDALE, N. DAK.

SPRING

Altitude (km)	Temperature		Pressure		Humidity	Density		Lapse rate	Extremes				Number of observations
	°C.	°F.	mb	Inches	Percent	kg/m³	lbs./ft.³	°C./100m	Max. °C.	Date	Min. °C.	Date	
0.444	5.3	41.5	961.9	28.40	66	1.201	0.0750	----	----	----	----	----	1,361
½	5.0	41.0	955.3	28.21	66	1.194	.0745	0.54	----	----	----	----	1,360
1	2.8	37.0	898	26.52	62	1.132	.0707	.44	----	----	----	----	1,343
1½	.8	33.4	844	24.92	59	1.072	.0669	.40	----	----	----	----	1,238
2	−1.5	29.3	793	23.42	57	1.016	.0634	.46	----	----	----	----	1,073
2½	−4.1	24.6	745	22.00	56	.964	.0602	.52	----	----	----	----	859
3	−6.9	19.6	699	20.64	56	.914	.0571	.56	----	----	----	----	617
4	−12.5	9.5	614	18.13	54	.820	.0512	.56	----	----	----	----	196
5	−18.6	−1.5	538	15.89	52	.736	.0459	.61	----	----	----	----	43
6	−25.1	−13.2	469	13.85	52	.659	.0411	.65	----	----	----	----	13
7	−31.5	−24.7	408	12.05	51	.589	.0368	.64	----	----	----	----	10
8	−38.2	−36.8	354	10.45	50	.525	.0328	.67	----	----	----	----	9
9	−44.6	−48.3	307	9.07	50	0.468	0.0292	0.64	----	----	----	----	9
10	−50.0	−58.0	264	7.80	49	.413	.0258	.54	----	----	----	----	9
11	−51.4	−60.5	228	6.73	48	.359	.0224	.14	----	----	----	----	9
12	−53.1	−63.6	196	5.79	48	.311	.0194	.17	----	----	----	----	9
13	−50.7	−59.3	169	4.99	48	----	----	+.24	----	----	----	----	9
14	−49.7	−57.5	146	4.31	47	----	----	+.10	----	----	----	----	9
15	−50.2	−58.4	126	3.72	47	----	----	.05	----	----	----	----	8
16	−50.2	−58.4	109	3.22	47	----	----	.00	----	----	----	----	8
17	−49.9	−57.8	95	2.81	47	----	----	+.03	----	----	----	----	7
18	−49.2	−56.6	83	2.45	47	----	----	+.07	----	----	----	----	3
19	−50.0	−58.0	72	2.13	47	----	----	.08	----	----	----	----	1

SUMMER

Altitude (km)	Temperature		Pressure		Humidity	Density		Lapse rate	Extremes				Number of observations
	°C.	°F.	mb	Inches	Percent	kg/m³	lbs./ft.³	°C./100m	Max. °C.	Date	Min. °C.	Date	
0.444	20.2	68.4	962.6	28.43	67	1.136	0.0709	----	----	----	----	----	1,253
½	19.9	67.8	956.5	28.25	66	1.131	.0706	0.54	----	----	----	----	1,253
1	17.5	63.5	902	26.64	61	1.076	.0672	.48	----	----	----	----	1,243
1½	15.0	59.0	851	25.13	58	1.025	.0640	.50	----	----	----	----	1,142
2	12.2	54.0	802	23.68	56	.976	.0609	.56	----	----	----	----	984
2½	9.2	48.6	755	22.30	54	.929	.0580	.60	----	----	----	----	799
3	6.3	43.3	711	21.00	52	.884	.0552	.58	----	----	----	----	580
4	.5	32.9	629	18.57	48	.800	.0499	.58	----	----	----	----	209
5	−5.4	22.3	555	16.39	48	.722	.0451	.59	----	----	----	----	29
6	−10.9	12.4	488	14.41	46	.648	.0405	.55	----	----	----	----	9
7	−17.3	.9	429	12.67	44	.584	.0365	.64	----	----	----	----	4
8	−24.5	−12.1	375	11.07	40	.526	.0328	.72	----	----	----	----	4
9	−31.3	−24.3	327	9.66	37	0.471	0.0294	0.68	----	----	----	----	4
10	−39.1	−38.4	283	8.36	36	.422	.0263	.78	----	----	----	----	4
11	−46.0	−50.8	246	7.26	36	.378	.0236	.69	----	----	----	----	3
12	−47.8	−54.0	212	6.26	35	.328	.0205	.18	----	----	----	----	3
13	−47.5	−53.5	183	5.40	34	----	----	+.03	----	----	----	----	3
14	−49.3	−56.7	158	4.67	32	----	----	.18	----	----	----	----	3
15	−51.5	−60.7	136	4.02	31	----	----	.22	----	----	----	----	3
16	−54.0	−65.2	116	3.43	31	----	----	.25	----	----	----	----	3
17	−54.9	−66.8	100	2.95	31	----	----	.09	----	----	----	----	3
18	−55.4	−67.7	86	2.54	31	----	----	.05	----	----	----	----	2
19	−52.0	−61.6	74	2.19	31	----	----	+.34	----	----	----	----	1

AUTUMN

Altitude (km)	Temperature		Pressure		Humidity	Density		Lapse rate	Extremes				Number of observations
	°C.	°F.	mb	Inches	Percent	kg/m³	lbs./ft.³	°C./100m	Max. °C.	Date	Min. °C.	Date	
0.444	6.5	43.7	963.2	28.44	71	1.197	0.0747	----	----	----	----	----	1,262
½	6.5	43.7	956.7	28.25	69	1.189	.0742	0.00	----	----	----	----	1,262
1	6.0	42.8	900	26.58	61	1.121	.0700	.10	----	----	----	----	1,251
1½	4.6	40.3	847	25.01	56	1.061	.0662	.28	----	----	----	----	1,172
2	2.5	36.5	796	23.51	53	1.005	.0627	.42	----	----	----	----	1,022
2½	0.0	32.0	748	22.09	52	.953	.0595	.50	----	----	----	----	816
3	−2.7	27.1	702	20.73	52	.903	.0564	.54	----	----	----	----	613
4	−8.2	17.2	618	18.25	50	.812	.0507	.55	----	----	----	----	214
5	−13.8	7.2	543	16.03	49	.729	.0455	.56	----	----	----	----	49
6	−19.6	−3.3	475	14.03	49	.653	.0408	.58	----	----	----	----	17
7	−25.5	−13.9	415	12.25	47	.584	.0365	.59	----	----	----	----	10
8	−32.7	−26.9	360	10.63	44	.522	.0326	.72	----	----	----	----	9
9	−40.7	−41.3	311	9.18	42	0.466	0.0291	0.80	----	----	----	----	8
10	−47.9	−54.2	267	7.88	41	.413	.0258	.72	----	----	----	----	8
11	−52.0	−61.6	229	6.76	41	.361	.0225	.41	----	----	----	----	8
12	−54.1	−65.4	196	5.79	40	.312	.0195	.21	----	----	----	----	8
13	−55.0	−67.0	167	4.93	40	----	----	.09	----	----	----	----	8
14	−56.0	−68.8	143	4.22	40	----	----	.10	----	----	----	----	8
15	−56.0	−68.8	121	3.57	40	----	----	.00	----	----	----	----	6
16	−56.1	−69.0	103	3.04	40	----	----	.01	----	----	----	----	4
17	−56.0	−68.8	87	2.57	40	----	----	+.01	----	----	----	----	3
18	−53.4	−64.1	75	2.21	43	----	----	+.26	----	----	----	----	1
19	----	----	65	1.92	43	----	----	----	----	----	----	----	----

WINTER

Altitude (km)	Temperature		Pressure		Humidity	Density		Lapse rate	Extremes				Number of observations
	°C.	°F.	mb	Inches	Percent	kg/m³	lbs/ft.³	°C./100m	Max. °C.	Date	Min. °C.	Date	
0.444	−9.8	14.4	963.3	28.45	81	1.274	0.0795	----	----	----	----	----	1291
½	−9.7	14.5	956.3	28.24	79	1.264	.0789	+0.18	----	----	----	----	1291
1	−7.7	18.1	896	26.46	66	1.175	.0734	+.40	32.0	Aug. 23, 1925	−33.7	Jan. 4, 1924	1273
1½	−7.3	18.9	840	24.81	59	1.100	.0687	+.08	----	----	----	----	1171
2	−8.8	16.2	787	23.24	57	1.037	.0647	.30	25.7	July 26, 1919	−33.6	Jan. 4, 1924	1019
2½	−11.0	12.2	738	21.79	57	.981	.0612	.44	----	----	----	----	807
3	−13.6	7.5	691	20.41	56	.927	.0579	.52	18.0	June 22, 1922	−36.8	Jan. 4, 1924	559
4	−19.2	−2.6	605	17.87	54	.830	.0518	.56	10.2	do	−39.6	Feb. 9, 1933	134
5	−25.4	−13.7	528	15.59	53	.743	.0464	.62	2.2	July 20, 1933	−45.8	do	24
6	−32.3	−26.1	459	13.55	52	.664	.0415	.69	−2.4	Sept. 1, 1925	−52.8	do	12
7	−38.6	−37.5	398	11.75	51	.592	.0370	.63	−13.0	Aug. 11, 1932	−55.0	do	11
8	−44.4	−47.9	343	10.13	50	.523	.0327	.58	−17.0	do	−55.0	Jan. 26, 1933	11
9	−48.0	−54.4	295	8.71	49	.457	.0285	.36	−22.0	do	−57.5	do	11
10	−49.1	−56.4	254	7.50	47	.395	.0247	.11	−30.0	do	−62.5	Feb. 23, 1933	11
11	−47.8	−54.0	219	6.47	46	.339	.0212	+.13	−35.7	do	−59.4	do	11
12	−46.6	−51.9	189	5.58	45	.291	.0182	+.12	−42.0	do	−63.3	Apr. 27, 1933	11
13	−46.9	−52.4	164	4.84	43	----	----	.03	----	----	----	----	11
14	−46.0	−50.8	142	4.19	42	----	----	+.09	----	----	----	----	11
15	−46.1	−51.0	123	3.63	41	----	----	.01	----	----	----	----	10
16	−46.7	−52.1	107	3.16	41	----	----	.06	----	----	----	----	9
17	−47.6	−53.7	93	2.75	39	----	----	.09	----	----	----	----	6
18	−46.9	−52.4	81	2.39	38	----	----	+.07	----	----	----	----	4
19	−45.3	−49.5	71	2.10	----	----	----	+.16	----	----	----	----	4
20	−45.8	−50.4	62	1.83	----	----	----	.05	----	----	----	----	1
21	−46.4	−51.5	55	1.62	----	----	----	.06	----	----	----	----	1
22	−45.8	−50.4	48	1.42	----	----	----	+.06	----	----	----	----	1
23	−43.4	−46.1	42	1.24	----	----	----	+.24	----	----	----	----	1

TABLE 2.—*Data for the 7 central stations*—Continued

GROESBECK, TEX.

SPRING

Altitude (km)	Temperature		Pressure		Humidity	Density		Lapse rate	Extremes				Number of observations
									Max.	Date	Min.	Date	
	°C.	°F.	mb	Inches	Per cent	kg/m³	lbs./ft.³	°C./100m	°C.		°C.		
0.141	17.4		997.7		72								1,044
½	15.3		956.6		70			0.58					1,041
1	13.4		902		63			.38					994
1½	11.9		850		52			.30					877
2	9.9		801		45			.40					711

Altitude (km)	Temperature		Pressure		Humidity	Density		Lapse rate	Extremes				Number of observations
									Max.	Date	Min.	Date	
	°C.	°F.	mb	Inches	Per cent	kg/m³	lbs./ft.³	°C./100m	°C.		°C.		
2½	7.4		754		42			0.50					520
3	4.6		709		41			.56					341
4	−1.5		626		43			.61					86
5	−7.2		552		44			.57					16
6	−13.0							.58					1

SUMMER

Altitude (km)	Temperature		Pressure		Humidity	Density		Lapse rate	Extremes				Number of observations
									Max.	Date	Min.	Date	
	°C.	°F.	mb	Inches	Per cent	kg/m³	lbs./ft.³	°C./100m	°C.		°C.		
0.141	26.0		999.0		75								905
½	23.6		959.0		74			0.67					903
1	21.4		905		63			.44					841
1½	18.9		854		58			.50					718
2	16.3		805		54			.52					528

Altitude (km)	Temperature		Pressure		Humidity	Density		Lapse rate	Extremes				Number of observations
									Max.	Date	Min.	Date	
	°C.	°F.	mb	Inches	Per cent	kg/m³	lbs./ft.³	°C./100m	°C.		°C.		
2½	13.5		759		51			0.56					358
3	10.8		715		48			.54					192
4	5.2		633		44			.56					43
5	0.0				32			.52					6

AUTUMN

Altitude (km)	Temperature		Pressure		Humidity	Density		Lapse rate	Extremes				Number of observations
									Max.	Date	Min.	Date	
	°C.	°F.	mb	Inches	Percent	kg/m³	lbs/ft³	°C./100m	°C.		°C.		
0.141	18.3	64.9	1,000.9	29.56	75	1.190	0.0743						902
½	17.2	63.0	959.8	28.34	70	1.146	.0715	0.31					897
1	15.2	59.4	905	26.72	64	1.089	.0680	.40	27.2	May 28, 1927	−17.6	Jan. 1, 1928	836
1½	13.2	55.8	853	25.19	58	1.034	.0646	.40					716
2	11.0	51.8	804	23.74	53	.983	.0614	.44	25.0	May 30, 1927	−11.6	Feb. 5, 1924	593
2½	8.7	47.7	757	22.35	48	.934	.0583	.46					467
3	6.3	43.3	713	21.05	44	.887	.0554	.48	15.7	June 18, 1924	−14.6	Jan. 3, 1919	328
4	1.0	33.8	631	18.63	40	.801	.0500	.53	8.6	June 15, 1922	−13.1	Feb. 12, 1920	111
5	−4.8	23.4	557	16.45	38	.723	.0451	.58	2.3	Sept. 16, 1921	−18.4	Jan. 14, 1924	37
6	−11.6	11.1	491	14.50	36	.654	.0408	.68					24
7	−18.9	−2.0	431	12.73	34	.591	.0369	.73					22
8	−26.8	−16.2	376	11.10	33	.532	.0332	.79					20
9	−34.3	−29.7	328	9.69	33	.479	.0299	.75					19
10	−41.1	−42.2	285	8.42	33	.428	.0267	.68					19
11	−47.0	−52.6	247	7.29	33	.381	.0238	.59					17
12	−52.0	−61.6	213	6.29	32	.336	.0210	.50					16
13	−56.3	−69.3	183	5.40	31			.43					16
14	−60.4	−76.7	157	4.64	30			.41					16
15	−64.2	−83.6	135	3.99	29			.38					15
16	−65.8	−86.4	116	3.43	29			.16					11
17	−65.2	−85.4	99	2.92	29			+.06					9
18	−64.3	−83.7	85	2.51	29			+.09					4
19	−62.7	−80.9	73	2.16	29			+.16					3
20	−61.0	−77.8	62	1.83	29			+.09					2
21	−60.3	−76.5	54	1.59	29			+.07					1
22	−59.6	−75.3	46	1.36	29			+.07					1
23			39	1.15	29								
24			33	.97	29								
25			28	.83	29								
26			24	.71	29								
27			21	.62	29								
28			17	.50	29								

WINTER

Altitude (km)	Temperature		Pressure		Humidity	Density		Lapse rate	Extremes				Number of observations
									Max.	Date	Min.	Date	
	°C.	°F.	mb	Inches	Per cent	kg/m³	lbs./ft.³	°C./100m	°C.		°C.		
0.141	8.8		1003.4		75								971
½	8.1		960.7		68			0.19					967
1	7.8		904		58			.06					888
1½	6.8		851		50			.20					761
2	5.1		801		44			.34					633
2½	2.9		753		41			.44					484

Altitude (km)	Temperature		Pressure		Humidity	Density		Lapse rate	Extremes				Number of observations
									Max.	Date	Min.	Date	
	°C.	°F.	mb	Inches	Per cent	kg/m³	lbs./ft.³	°C./100m	°C.		°C.		
3	0.6		708		38			0.46					331
4	−4.6		625		35			.52					83
5	−10.3		550		33			.57					23
6	−16.6				32			.63					1
7	−21.6							.50					1

TABLE 2.—*Data for the 7 central stations*—Continued

OMAHA, NEBR.

SPRING

Altitude (km)	Temperature °C.	Temperature °F.	Pressure mb	Pressure Inches	Humidity Percent	Density kg/m³	Density lbs./ft.³	Lapse rate °C./100m	Extremes Max. °C.	Date	Min. °C.	Date	Number of observations
0.300	6.8	44.2	979.3	28.92	74	1.216	0.0759						394
½	6.2	43.2	956.8	28.25	70	1.191	.0744	0.30					394
1	6.0	42.8	900	26.58	62	1.121	.0700	.04					393
1½	4.4	39.9	847	25.01	57	1.061	.0662	.32					392
2	2.4	36.3	796	23.51	54	1.005	.0627	.40					391
2½	-.1	31.8	748	22.09	53	.953	.0595	.50					390
3	-3.0	26.6	703	20.76	52	.906	.0566	.58					389
4	-9.4	15.1	618	18.25	51	.816	.0509	.64					381
5	-16.3	2.7	543	16.03	50	.736	.0459	.69					355
6	-23.7	-10.7	475	14.03	49	.664	.0415	.74					38
7	-29.9	-21.8	414	12.23	47	.593	.0370	.62					15
8	-36.3	-33.3	360	10.63	45	.530	.0331	.64					15
9	-43.1	-45.6	311	9.18	43	.471	.0294	.68					14
10	-48.7	-55.7	268	7.91	42	.416	.0260	.56					14
11	-53.2	-63.8	231	6.82	41	.366	.0228	.45					14

Altitude (km)	Temperature °C.	Temperature °F.	Pressure mb	Pressure Inches	Humidity Percent	Density kg/m³	Density lbs./ft.³	Lapse rate °C./100m	Extremes Max. °C.	Date	Min. °C.	Date	Number of observations
12	-55.4	-67.7	199	5.88	40	0.319	0.0199	0.22					14
13	-56.5	-69.7	171	5.05	39			.11					14
14	-56.0	-68.8	147	4.34	38			+.05					14
15	-55.6	-68.1	126	3.72	38			+.04					14
16	-55.8	-68.4	108	3.19	38			.02					14
17	-55.2	-67.4	93	2.75	38			+.06					13
18	-55.4	-67.7	79	2.33	38			.02					10
19	-54.2	-65.6	68	2.01	37			+.12					3
20	-52.5	-62.5	58	1.71	37			+.17					1
21			50	1.48	37								
22			44	1.30	37								
23			37	1.09									
24			32	.94									
25			26	.77									

SUMMER

Altitude (km)	Temperature °C.	Temperature °F.	Pressure mb	Pressure Inches	Humidity Percent	Density kg/m³	Density lbs./ft.³	Lapse rate °C./100m	Extremes Max. °C.	Date	Min. °C.	Date	Number of observations
0.300	20.2	68.4	978.6	28.90	79	1.154	0.0720						374
½	21.6	70.9	957.4	28.27	69	1.124	.0702	+0.70					374
1	22.3	72.1	903	26.67	55	1.058	.0661	+.14					373
1½	19.7	67.5	852	25.16	53	1.008	.0629	.52					373
2	16.7	62.1	803	23.71	52	.961	.0600	.60					373
2½	13.4	56.1	757	22.35	51	.917	.0572	.66					372
3	9.9	49.8	713	21.05	51	.875	.0546	.70					372
4	3.1	37.6	631	18.63	49	.794	.0496	.68					370
5	-3.5	25.7	559	16.51	46	.721	.0450	.66					348
6	-9.2	15.4	492	14.53	43	.649	.0405	.57					17
7	-14.5	5.9	432	12.76	39	.582	.0363	.53					17
8	-21.2	-6.2	378	11.16	37	.523	.0327	.67					17
9	-27.2	-17.0	330	9.74	36	.468	.0292	.60					17
10	-34.1	-29.4	287	8.48	35	.418	.0261	.69					17
11	-40.8	-41.4	249	7.35	34	.374	.0233	.67					17
12	-46.6	-51.9	215	6.35	33	.331	.0207	.58					16

Altitude (km)	Temperature °C.	Temperature °F.	Pressure mb	Pressure Inches	Humidity Percent	Density kg/m³	Density lbs./ft.³	Lapse rate °C./100m	Extremes Max. °C.	Date	Min. °C.	Date	Number of observations
13	-51.5	-60.7	185	5.46	32			0.49					16
14	-55.8	-68.4	158	4.67	32			.43					16
15	-58.7	-73.7	135	3.98	32			.29					16
16	-60.4	-76.7	115	3.40	32			.17					16
17	-60.8	-77.4	98	2.89	32			.04					14
18	-60.2	-76.4	83	2.45	32			+.06					11
19	-57.4	-71.3	71	2.07	32			+.28					10
20	-55.2	-67.4	60	1.77	32			+.22					9
21	-52.8	-63.0	52	1.54	32			+.24					7
22	-50.3	-58.5	44	1.30	32			+.25					6
23	-47.7	-53.9	38	1.12	32			+.26					4
24	-45.8	-50.4	32	.94	32			+.19					3
25	-43.4	-46.1	27	.80	32			+.24					3
26	-41.2	-42.2	23	.68	31			+.22					2
27	-39.7	-39.5	19	.56	31			+.15					2

AUTUMN

Altitude (km)	Temperature °C.	Temperature °F.	Pressure mb	Pressure Inches	Humidity Percent	Density kg/m³	Density lbs./ft.³	Lapse rate °C./100m	Extremes Max. °C.	Date	Min. °C.	Date	Number of observations
0.300	8.8	47.8	981.3	28.98	81	1.209	0.0755						470
½	10.1	50.2	958.9	28.32	73	1.176	.0734	+0.65					470
1	11.3	52.3	903	26.67	59	1.103	.0689	+.24					470
1½	10.0	50.0	850	25.10	54	1.043	.0651	.26					468
2	8.1	46.6	800	23.62	50	.989	.0617	.38					467
2½	5.8	42.4	753	22.24	47	.939	.0586	.46					465
3	3.0	37.4	708	20.91	46	.892	.0557	.56					463
4	-3.1	26.4	625	18.46	44	.806	.0503	.61					456
5	-9.6	14.7	551	16.27	42	.728	.0454	.65					442
6	-16.6	2.1	484	14.29	40	.657	.0410	.70					93
7	-23.2	-9.8	424	12.52	39	.591	.0369	.66					18
8	-30.6	-23.1	368	10.87	37	.529	.0330	.74					17
9	-37.6	-35.7	320	9.45	35	.474	.0296	.70					16
10	-43.9	-47.0	277	8.18	33	.421	.0263	.63					16

Altitude (km)	Temperature °C.	Temperature °F.	Pressure mb	Pressure Inches	Humidity Percent	Density kg/m³	Density lbs./ft.³	Lapse rate °C./100m	Extremes Max. °C.	Date	Min. °C.	Date	Number of observations
11	-49.0	-56.2	239	7.06	32	.372	.0232	0.51					16
12	-52.5	-62.5	206	6.08	31	.326	.0204	.35					14
13	-54.1	-65.4	177	5.23	31			.16					14
14	-55.0	-67.0	152	4.49	30			.09					14
15	-55.7	-68.3	130	3.84	29			.07					12
16	-56.5	-69.7	112	3.31	28			.08					12
17	-56.3	-69.3	97	2.86	28			+.02					10
18	-56.3	-69.3	83	2.45	27			.00					9
19	-56.6	-69.9	72	2.13	27			.03					6
20	-51.8	-61.2	63	1.86	27			+.48					4
21	-49.6	-57.3	55	1.62	27			+.22					3
22	-47.6	-53.7	47	1.39	27			+.20					2
23	-45.4	-49.7	41	1.21	27			+.22					2
24	-45.6	-50.1	36	1.06	26			.02					1

WINTER

Altitude (km)	Temperature °C.	Temperature °F.	Pressure mb	Pressure Inches	Humidity Percent	Density kg/m³	Density lbs./ft.³	Lapse rate °C.	Extremes Maximum °C.	Date	Minimum °C.	Date	Number of observations
0.300	-4.0	24.8	983.4	29.04	80	1.272	0.0794						432
½	-3.3	26.1	959.7	28.34	76	1.238	.0773	+0.35					432
1	-1.7	28.9	901	26.61	66	1,155	.0721	+.32	35.9	July 13, 1934	-29.7	Feb. 9, 1933	432
1½	-1.0	30.2	846	24.98	57	1.082	.0675	+.14					430
2	-1.9	28.6	794	23,45	52	1.019	.0636	.18	27.9	July 13, 1934	-29.9	Feb. 9, 1933	425
2½	-4.1	24.6	745	22.00	51	.964	.0602	.44					421
3	-6.5	20.3	699	20.64	50	.913	.0570	.48	18.9	Sept. 6, 1931	-30.8	Feb. 9, 1933	417
4	-12.3	9.9	613	18.10	48	.819	.0511	.58	10.2	July 22, 1934	-34.4	do	409
5	-18.7	-1.7	537	15.86	45	.735	.0459	.64	5.2	Sept. 8, 1933	-39.5	Jan. 30, 1932	388
6	-25.6	-14.1	470	13.88	43	.662	.0413	.69	-5.2	June 22, 1933	-45.5	Feb. 9, 1933	98
7	-32.4	-26.3	409	12.08	41	.592	.0370	.68	-11.2	July 13, 1933	-51.0	do	57
8	-38.8	-37.8	354	10.45	40	.527	.0329	.64	-18.2	June 22, 1933	-51.9	Oct. 11, 1909	55
9	-44.6	-48.3	306	9.04	39	.467	.0292	.58	-23.0	July 13, 1933	-55.2	Feb. 9, 1911	55
10	-48.9	-56.0	263	7.77	38	.409	.0255	.43	-29.4	Aug. 10, 1933	-57.7	Oct. 30, 1909	55
11	-51.7	-61.1	226	6.67	37	.356	.0222	.28	-35.0	July 13, 1933	-62.1	do	55
12	-53.0	-63.4	194	5.73	36	.307	.0192	.13	-38.5	July 27, 1933	-63.7	Feb. 28, 1933	55
13	-53.2	-63.8	166	4.90	35			.02					53
14	-53.6	-64.5	142	4.19	34			.04					50
15	-54.5	-66.1	121	3.57	33			.09					45
16	-55.3	-67.5	104	3.07	33			.08					25
17	-55.3	-67.5	89	2.63	33			.00					24
18	-55.2	-67.4	76	2.24	33			+.01					18
19	-54.7	-66.5	65	1.92	33			+.05					13
20	-53.4	-64.1	56	1.65	33			+.13					8
21	-53.0	-63.4	48	1.42	33			+.04					6
22	-52.5	-62.5	41	1.21	33			+.05					1
23	-52.4	-62.3	36	1.06	32			+.01					1
24	-52.8	-62.1	30	0.89	32			+.01					1

TABLE 2.—*Data for the 7 central stations*—Continued

ROYAL CENTER, IND.

SPRING

Altitude (km)	Temperature °C.	Temperature °F.	Pressure mb	Pressure Inches	Humidity Percent	Density kg/m³	Density lbs./ft.³	Lapse rate °C./100m	Extremes Max. °C.	Date	Min. °C.	Date	Number of observations
0.225	10.1	50.2	989.0	29.21	67	1.213	0.0757						987
½	7.8	46.0	956.8	28.25	67	1.184	.0739	0.84					987
1	5.3	41.5	901	26.61	64	1.125	.0702	.50					943
1½	3.1	37.6	848	25.04	60	1.068	.0667	.44					866
2	.9	33.6	797	23.54	57	1.012	.0632	.44					722
2½	−1.5	29.3	749	22.12	53	.960	.0599	.48					554
3	−4.0	24.8	704	20.79	51	.911	.0569	.50					384
4	−9.4	15.1	621	18.34	48	.820	.0512	.54					148
5	−15.5	4.1	547	16.15	49	.740	.0462	.61					57
6	−21.9	−7.4	480	14.17	52	.666	.0416	.64					24
7	−28.9	−20.0	419	12.37	52	.598	.0373	.70					21
8	−36.1	−33.0	364	10.75	51	0.535	0.0334	0.72					29
9	−43.2	−45.8	316	9.33	50	.479	.0299	.71					10
10	−50.0	−58.0	273	8.06		.427	.0267	.68					17
11	−56.0	−68.8	235	6.94		.377	.0235	.60					16
12	−60.9	−77.6	201	5.94		.330	.0206	.49					11
13	−64.0	−83.2	173	5.11				.31					9
14	−68.6	−91.5	147	4.34				.46					4
15	−70.6	−95.1	124	3.66				.20					2
16	−74.9	−102.8	103	3.04				.43					1
17	−72.8	−99.0	86	2.54				+.21					1

SUMMER

Altitude (km)	Temperature °C.	Temperature °F.	Pressure mb	Pressure Inches	Humidity Percent	Density kg/m³	Density lbs./ft.³	Lapse rate °C./100m	Extremes Max. °C.	Date	Min. °C.	Date	Number of observations
0.225	23.2		989.2		65								767
½	20.7		958.5		65			0.91					765
1	17.5		904		66			.64					710
1½	14.5		853		65			.60					626
2	11.7		804		61			.56					536
2½	9.0		758		56			.54					406
3	6.3		714		52			.54					278
4	1.0		632		44			0.53					88
5	−4.5				40			.55					19
6	−10.6				40			.61					9
7	−16.4				25			.58					3
8	−20.2				20			.38					2
9	−27.4				19			.72					1

AUTUMN

Altitude (km)	Temperature °C.	Temperature °F.	Pressure mb	Pressure Inches	Humidity Percent	Density kg/m³	Density lbs./ft.³	Lapse rate °C./100m	Extremes Max. °C.	Date	Min. °C.	Date	Number of observations
0.225	12.2	54.0	991.5	29.28	70	1.206	0.0753						903
½	10.7	51.3	959.5	28.33	68	1.174	.0733	0.55					902
1	8.4	47.1	904	26.70	65	1.116	.0697	.46					845
1½	6.3	43.3	851	25.13	60	1.059	.0661	.42					756
2	4.1	39.4	801	23.65	55	1.005	.0627	.44					632
2½	1.8	35.2	754	22.27	51	.954	.0596	.46					502
3	−0.6	30.9	709	20.94	49	.905	.0565	.48					363
4	−5.8	21.6	627	18.52	45	.817	.0510	.52					101
5	−11.5	11.3	553	16.33	38	.736	.0459	.57					37
6	−17.4	0.7	487	14.38	30	.664	.0415	.59					27
7	−24.3	−11.7	427	12.61	29	.598	.0373	.69					25
8	−31.4	−24.5	373	11.01	27	.538	.0336	.71					25
9	−38.9	−38.0	325	9.60	26	.484	.0302	.75					25
10	−46.6	−51.9	282	8.33	24	.434	.0271	.77					25
11	−53.3	−63.9	244	7.21	23	0.387	0.0242	0.67					25
12	−59.4	−74.9	209	6.17	22	.341	.0213	.61					19
13	−63.8	−82.8	179	5.29	22			.44					18
14	−67.0	−88.6	153	4.52	22			.32					14
15	−68.6	−91.5	130	3.84	22			.16					11
16	−70.0	−94.0	111	3.28	22			14					3
17	−71.7	−97.1	94	2.78	22			.17					2
18	−72.1	−97.8	80	2.36	22			.04					2
19	−71.3	−96.3	78	2.30	22			+.08					2
20	−71.4	−96.5	68	2.01	22			.01					1
21	−71.3	−96.3	59	1.74	22			+.01					1
22	−70.9	−95.6	51	1.51	22			+.04					1
23	−70.4	−94.7	45	1.33	22			+.05					1

WINTER

Altitude (km)	Temperature °C.	Temperature °F.	Pressure mb	Pressure Inches	Humidity Percent	Density kg/m³	Density lbs./ft.³	Lapse rate °C./100 m	Extremes Maximum °C.	Date	Minimum °C.	Date	Number of observations
0.225	−2.2	28.0	991.7	29.28	79	1.274	0.0795						964
½	−3.6	25.5	957.7	28.28	77	1.237	.0772	0.51					963
1	−4.2	24.4	899	26.55	68	1.164	.0727	.12	30.6	Aug. 12, 1918	−26.2	Jan. 5, 1924	915
1½	−4.8	23.4	843	24.89	59	1.094	.0683	.12					809
2	−6.1	21.0	791	23.36	54	1.031	.0644	.26	23.4	Aug. 5, 1918	−29.4	Jan. 5, 1924	675
2½	−8.0	17.6	741	21.88	53	.973	.0607	.38					481
3	−10.3	13.5	695	20.52	53	.921	.0575	.46	15.8	Aug. 5, 1918	−28.0	Dec. 27, 1925	288
4	−15.9	3.4	610	18.01	52	.826	.0516	.56	8.9	Nov. 3, 1923	−27.8	Mar. 7, 1920	76
5	−22.8	−9.0	535	15.80	49	.745	.0465	.69	−.3	Sept. 1, 1930	−32.1	Feb. 19, 1931	34
6	−30.5	−22.9	466	13.76	47	.669	.0418	.77	−4.5	Sept. 11, 1930	−41.5	do	30
7	−38.0	−36.4	405	11.96	45	.600	.0375	.75	−10.6	do	−50.1	do	29
8	−46.4	−51.5	349	10.31	44	.537	.0335	.84	−17.0	do	−51.6	Feb. 11, 1931	27
9	−54.3	−65.7	299	8.83	44	.476	.0297	.79	−24.1	Sept. 12, 1930	−59.6	Feb. 10, 1931	26
10	−60.7	−77.3	256	7.56	43	.420	.0262	.64	−30.5	do	−62.9	Feb. 6, 1931	24
11	−62.7	−80.9	218	6.44	43	.361	.0225	.20	−38.5	do	−66.7	Feb. 8, 1931	21
12	−61.1	−78.0	185	5.46	41	.304	.0190	+.16	−45.0	do	−67.1	do	18
13	−59.2	−74.6	157	4.64	40			+.19					13
14	−59.4	−74.9	133	3.93	38			.02					11
15	−60.2	−76.4	113	3.34	38			.08					9
16	−60.8	−77.4	96	2.83	38			.06					8
17	−62.1	−79.8	80	2.36	36			.13					6
18	−63.7	−82.7	68	2.01	36			.16					2
19	−66.4	−87.5	57	1.68	37			.27					1
20	−67.4	−89.3	47	1.39	37			.10					1
21	−68.2	−90.8	39	1.15	37			.08					1
22	−69.0	−92.2	32	.94	36			.08					1
23	−69.4	−92.9	26	.77	36			.04					1
24	−69.7	−93.5	21	.62	36			.03					1
25	−70.1	−94.2	17	.50	36			.04					1
26	−70.5	−94.9	13	.38	36			.04					1
27	−70.9	−95.6	10	.30	36			.04					1

TABLE 2.—*Data for the 7 cental stations*—Continued

SCOTT FIELD, ILL.

SPRING

Altitude (km)	Temperature		Pressure		Humidity	Density		Lapse rate	Extremes				Number of observations
									Maximum	Date	Minimum	Date	
	°C.	°F.	mb	Inches	Per cent	kg/m³	lbs./ft.³	°C./100 m	°C.		°C.		
0.135	9.5	49.1	1000.5	29.54	83	1.229	0.0767						88
½	11.1	52.0	957.6	28.28	62	1.170	.0730	+0.44					88
1	9.5	49.1	902	26.64	57	1.109	.0692	.32					88
1½	7.2	45.0	849	25.07	55	1.053	.0657	.46					88
2	5.0	41.0	799	23.59	52	.999	.0624	.44					87
2½	2.6	36.7	751	22.18	47	.948	.0592	.48					86
3	.1	32.2	706	20.85	45	.899	.0561	.50					86
4	−6.0	21.2	623	18.40	44	.812	.0507	.61					81
5	−12.3	9.9	549	16.21	43	.733	.0458	.63					76
6	−17.5	.5						.52					13
7	−24.6	−12.3						.71					12
8	−32.8	−27.0						.82					12
9	−40.9	−41.6						.81					12
10	−48.1	−54.6						.72					10
11	−52.3	−62.1						.42					8
12	−53.9	−65.0						.16					8
13	−54.2	−65.6						.03					6
14	−55.0	−67.0						.08					5
15	−56.9	−70.4						.19					4
16	−54.7	−66.5						+.22					1

SUMMER

Altitude (km)	°C.	°F.	mb	Inches	Per cent	kg/m³	lbs./ft.³	°C./100 m	Maximum °C.	Date	Minimum °C.	Date	Number of observations
0.135	20.5	68.9	999.0	29.50	89	1.176	.0734						156
½	23.9	75.0	959.1	28.32	65	1.117	.0697	+0.93					156
1	22.1	71.8	906	26.75	63	1.062	.0663	.36					156
1½	19.1	66.4	855	25.25	62	1.013	.0632	.60					156
2	16.0	60.8	807	23.83	61	.968	.0604	.62					155
2½	12.9	55.2	761	22.47	58	.923	.0576	.62					155
3	9.7	49.5	717	21.17	55	.880	.0549	.64					155
4	3.1	37.6	635	18.75	53	.799	.0499	.66					155
5	−2.9	26.8	562	16.60	49	.724	.0452	.60					147
6	−9.2	15.4	494	14.59	34	.652	.0407	.63					7
7	−16.8	1.8						.76					6
8	−25.6	−14.1						.88					6
9	−33.6	−28.5						.80					6
10	−42.1	−43.8						.85					5
11	−49.7	−57.5						.76					4
12	−55.1	−67.2						.54					4
13	−58.0	−72.4						.29					3
14	−55.0	−67.0						+.30					1
15	−50.4	−58.7						+.46					1

AUTUMN

Altitude (km)	°C.	°F.	mb	Inches	Per cent	kg/m³	lbs./ft.³	°C./100 m	Maximum °C.	Date	Minimum °C.	Date	Number of observations
0.135	10.2	50.4	1,002.3	29.60	87	1.228	0.0767						173
½	13.2	55.8	960.3	28.36	63	1.164	.0727	+0.82					173
1	11.7	53.1	904	26.70	60	1.102	.0688	.30					172
1½	9.8	49.6	852	25.16	55	1.046	.0653	.38					171
2	7.6	45.7	802	23.68	50	.993	.0620	.44					168
2½	5.2	41.4	754	22.27	47	.942	.0588	.48					166
3	2.6	36.7	710	20.97	45	.896	.0559	.52					163
4	−3.1	26.4	627	18.52	44	.808	.0504	.57					162
5	−9.3	15.3	553	16.33	40	.730	.0456	.62					154
6	−16.4	2.5	485	14.32	38	.658	.0411	.71					26
7	−24.0	−11.2	425	12.55	39	.594	.0371	.76					24
8	−32.4	−26.3	371	10.96	39	.537	.0335	.84					23
9	−40.1	−40.2	322	9.51	38	.482	.0301	.77					21
10	−46.3	−51.3	280	8.27	38	.430	.0268	.62					20
11	−51.6	−60.9	240	7.09	37	.378	.0236	.53					17
12	−54.9	−66.8	210	6.20	37	.336	.0210	.33					14
13	−55.9	−68.6	179	5.29	37			.10					10
14	−58.0	−72.4	157	4.64	37			.21					10
15	−58.2	−72.8	136	4.02	37			.02					10
16	−58.6	−73.5	117	3.46	37			.04					7
17	−59.3	−74.7	101	2.98	37			.07					5
18	−59.3	−74.7	87	2.57	37			.00					4
19	−58.7	−73.7	76	2.24	37			+.06					3
20	−58.6	−73.5	67	1.98				+.01					3
21	−58.3	−72.9	57	1.68				+.03					3
22	−58.1	−72.6	50	1.48				+.02					3
23	−57.4	−71.3	44	1.30				+.07					2
24	−56.7	−70.1	40	1.18				+.07					2

WINTER

Altitude (km)	°C.	°F.	mb	Inches	Per cent	kg/m³	lbs./ft.³	°C./100 m	Maximum °C.	Date	Minimum °C.	Date	Number of observations
0.135	−2.5	27.5	1,005.8	29.70	79	1.293	0.0807						88
½	−1.8	28.8	960.0	28.35	69	1.231	.0769	+0.19					88
1	−.8	30.6	901	26.61	59	1.151	.0719	+.20	32.1	July 24, 1934	−20.6	Feb. 18, 1936	87
1½	−.9	30.4	846	24.98	52	1.082	.0675	.02					84
2	−2.2	28.0	794	23.45	49	1.020	.0637	.26	23.8	July 20, 1934	−17.9	Jan. 25, 1905	84
2½	−3.9	25.0	745	22.00	46	.963	.0601	.34					84
3	−5.9	21.4	699	20.64	44	.911	.0569	.40	16.2	Sept. 23, 1904	−20.5	Jan. 30, 1936	84
4	−10.8	12.6	614	18.13	43	.815	.0509	.49	11.5	do	−27.5	do	84
5	−16.8	1.8	539	15.92	42	.733	.0458	.60	6.9	do	−29.8	Jan. 25, 1905	74
6	−23.1	−9.6	471	13.91	36	.656	.0410	.63	1.2	do	−34.9	Jan. 26, 1905	14
7	−30.6	−23.1	410	12.11	34	.589	.0368	.75	−5.1	do	−45.7	do	12
8	−38.6	−37.5	356	10.51	33	.529	.0330	.80	−10.6	do	−56.8	do	11
9	−45.2	−49.4	307	9.07	32	.470	.0293	.66	−17.0	do	−55.6	Jan. 7, 1930	10
10	−51.1	−60.0	263	7.77	31	.413	.0258	.59	−27.4	Sept. 15, 1904	−62.4	do	7
11	−56.4	−69.5	225	6.64	30	.362	.0226	.53	−33.2	do	−63.4	Oct. 20, 1907	6
12	−59.7	−75.5	192	5.67	30	.314	.0196	.33	−41.8	do	−62.3	May 14, 1906	6
13	−58.4	−73.1	164	4.84	30			+.13					6
14	−57.5	−71.5	139	4.10	29			+.09					5
15	−58.4	−73.1	119	3.51	29			.09					5
16	−59.3	−74.7	102	3.01	29			.09					4
17	−59.8	−75.6	87	2.57	29			.05					4
18	−59.6	−75.3	74	2.19	29			+.02					4
19	−59.0	−74.2	64	1.89				+.06					2
20	−57.5	−71.5	55	1.62				+.15					1
21	−55.7	−68.3	48	1.42				+.18					1
22	−53.9	−65.0	42	1.24				+.18					1

TABLE 3.—*Data for the 29 stations mostly having only kite and airplane observations*

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Date	Min.	Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Date	Min.	Date	Number of observations
	°C.	mb	Per cent	°C./100m	°C.		°C.				°C.	mb	Per cent	°C./100m	°C.		°C.		
ATLANTA, GA.																			
SPRING																			
0.303	12.3	980.8	82						92	2½	5.2	753	57	0.56					92
½	13.3	959.6	76	+0.51					92	3	2.4	709	51	.56					92
1	12.9	904	66	.08					92	4	−4.3	625	46	.67					92
1½	10.7	852	63	.44					92	5	−11.6	550	44	.73					92
2	8.0	801	61	.54					92										
SUMMER																			
0.303	21.5	981.3	85						73	2½	11.7	760	65	0.66					73
½	22.5	961.6	78	+0.51					73	3	8.4	716	63	.66					73
1	21.8	907	70	.14					73	4	1.8	633	59	.66					72
1½	18.5	856	70	.66					73	5	−4.4	559	49	.62					71
2	15.0	806	70	.70					73										
AUTUMN																			
0.303	12.3	984.0	86						84	3	4.8	711	49	0.48					81
½	13.0	963.0	82	+0.36					84	4	−1.2	627	44	.60					78
1	12.9	906	73	.02					84	5	−8.1	552	41	.69					73
1½	11.3	854	66	.32					84	6									
2	9.4	803	59	.38					82	7									
2½	7.2	756	53	.44					81										
WINTER																			
0.303	7.0	985.4	85						88	3	1.2	707	52	0.48	13.8	June 7, 1933	−14.1	Feb. 5, 1933	87
½	7.7	963.4	81	+0.36					88	4	−4.5	623	48	.57	6.5	Aug. 2, 1932	−16.6	Feb. 5, 1933	87
1	8.1	905	73	+.08	29.9	July 20, 1932	−17.6	Feb. 9, 1933	88	5	−11.2	547	44	.67	1.8	Aug. 3, 1932	−23.2	Mar. 4, 1933	85
1½	7.4	852	66	.14					88	6									
2	5.9	800	60	.30	19.7	July 20, 1932	−10.8	Feb. 9, 1933	88	7									
2½	3.6	752	56	.46					87										
AVALON, CALIF.																			
SUMMER																			
0.034	21.9	1,013.2	67						13	15	−54.5	134	21	0.11	−49.2	July 30, 1913	−61.5	July 27, 1913	9
½	19.5	959.4	68	0.52					13	16	−58.3	115	21	.38	−50.3	do	−66.6	Aug. 2, 1913	9
1	20.3	905	53	+.16	30.0	Aug. 3, 1913	10.1	July 28, 1913	13	17	−58.3	98	21	.00	−49.8	do	−63.9	do	9
1½	19.1		38	.24					13	18	−58.3	84	21	.00	−53.0	do	−61.8	do	8
2	17.9	805	32	.24	26.9	Aug. 7, 1913	9.6	July 27, 1913	13	19	−56.6	72	21	+.17	−50.7	do	−58.8	do	8
2½	14.5		29	.68					12	20	−54.6	62	21	+.20					8
3	11.1	716	27	.68	18.5	July 30, 1913	2.5	July 27, 1913	12	21	−52.2	53	21	+.24					7
4	3.4	634	25	.77	11.0	do	−4.7	do	12	22	−50.2	46	21	+.20					6
5	−4.1	558	28	.75	3.8	do	−13.3	do	12	23	−47.9	40	21	+.23					5
6	−11.3	491	24	.72	−3.5	do	−20.5	do	12	24	−46.9	36	21	+.10					2
7	−18.6	430	23	.73	−8.9	Aug. 8, 1913	−29.0	do	11	25	−44.8	32	21	+.21					2
8	−25.9	376	21	.73	−14.5	do	−38.4	do	11	26	−43.3	28	22	+.15					1
9	−32.4	327	20	.65	−21.3	do	−45.1	do	11	27	−41.6	24	22	+.17					1
10	−38.7	284	20	.63	−26.1	do	−50.2	do	11	28	−39.9	21	22	+.17					1
11	−44.4	245	21	.57	−31.5	do	−53.8	do	11	29	−39.6	19	22	+.03					1
12	−49.9	212	21	.55	−35.8	do	−57.4	do	11	30	−39.5	16	22	+.01					1
13	−52.1	182	21	.22	−38.7	do	−57.5	do	11	31	−39.2	15	22	+.03					1
14	−53.4	158	21	.13	−43.4	do	−58.7	do	11	32	−39.0	13	22	+.02					
BARKSDALE FIELD, LA. (SHREVEPORT)																			
SPRING																			
0.052	15.1	1,009.7	76						91	2½	7.0	754	43	0.52					90
½	17.0	958	60	+0.42					91	3	4.3	709	41	.54					90
1	14.8	903	57	.44					91	4	−1.6	627	39	.59					86
1½	12.2	851	55	.52					91	5	−8.3	553	31	.67					19
2	9.6	801	48	.52					90	6									
SUMMER																			
0.052	24.0	1,008.5	86						78	2½	13.7	761	59	0.60					77
½	25.6	958.2	64	+0.36					78	3	10.7	717	56	.56					77
1	22.7	905	66	.58					78	4	5.0	635	53	.59					77
1½	19.5	855	67	.64					78	5	−.9	562	45	.59					59
2	16.7	807	62	.56					77	6									
AUTUMN																			
0.052	15.5	1,012.5	82						86	2½	9.4	757	52	0.46					86
½	17.9	960.4	64	+0.54					86	3	7.0	713	49	.48					85
1	16.3	905	62	.32					86	4	1.8	631	45	.52					84
1½	14.1	853	61	.44					86	5	−3.9	557	41	.57					65
2	11.7	804	58	.48					86	6	−8.9	493	39	.50					2
WINTER																			
0.052	3.4	1,014.1	75						61	2½	2.2	752	39	0.36					60
½	5.5	959.5	61	+0.47					61	3	0.1	707	37	.42	13.9	June 17, 1935	−9.4	Jan. 20, 1936	59
1	6.2	903	50	+.14	29.2	Aug. 10, 1935	−6.2	Jan. 19, 1936	61	4	−5.1	624	33	.52	7.9	Aug. 8, 1935	−15.1	Jan. 19, 1936	58
1½	5.8	850	46	.08					61	5	−11.3	550	32	.62	2.5	Aug. 9, 1935	−23.4	Jan. 4, 1936	42
2	4.0	800	43	.36	20.4	July 12, 1935; Aug. 10, 1935	−5.7	Jan. 20, 1936	60	6									

TABLE 3.—*Data for the 29 stations mostly having only kite and airplane observations*—Continued

BILLINGS, MONT.

SPRING

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Date	Min.	Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Date	Min.	Date	Number of observations
	°C.	mb	Per cent	°C./100m	°C.		°C.				°C.	mb	Per cent	°C./100m	°C.		°C.		
1.088	1.3	889.2	71						88	2½	−2.3	746	60	0.68					87
½										3	−5.7	701	63	.68					87
1										4	−12.3	616	60	.66					87
1½	3.1	845.3	58	+0.44					88	5	−19.0	540	56	.67					84
2	1.1	794	56	.40					87	6									

SUMMER

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Date	Min.	Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Date	Min.	Date	Number of observations
1.088	16.3	890.9	56						153	2½	13.4	756	45	0.66					153
½										3	9.9	712	47	.70					153
1										4	2.4	630	49	.75					153
1½	18.9	849.5	45	+0.63					153	5	−5.3	557	47	.77					146
2	16.7	802	43	.44					153	6									

AUTUMN

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Date	Min.	Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Date	Min.	Date	Number of observations
1.088	6.1	892.1	62						176	2½	4.2	752	51	0.58					175
½										3	1.0	707	53	.64					175
1										4	−5.8	623	50	.68					174
1½	9.0	848.9	52	+0.70					176	5	−12.3	549	48	.65					166
2	7.1	799	50	.38					176	6	−19.1	484	51	.68					2

WINTER

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Date	Min.	Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Date	Min.	Date	Number of observations
1.088	−3.6	891.8	63						120	3	−6.3	702	56	0.64	19.0	July 28, 1935	−28.7	Feb. 8, 1936	120
½										4	−12.8	617	58	.65	11.0	July 28, 1935	−33.5	Feb. 8, 1936	118
1										5	−19.5	541	57	.67	1.5	Oct. 11, 1934	−37.2	{Feb. 7, 1936 Mar. 30, 1936}	113
1½	.2	846.6	54	+0.92					120	6									
2	−.5	796	51	.14	27.6	July 28, 1935	−36.9	Jan. 19, 1935	120										
2½	−3.1	748	52	.52					120										

BOSTON, MASS.

SPRING

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Date	Min.	Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Date	Min.	Date	Number of observations
0.006	7.3	1016.9	68						214	3	−5.4	698	55	0.46					211
½	4.7	957.1	65	0.53					214	4	−10.5	614	50	.51					200
1	2.7	899	62	.40					214	5	−16.5	539	48	.60					165
1½	0.9	844	60	.36					214	6	−23.2	470	45	.67					61
2	−1.0	793	59	.38					214	7	−30.4		50	.72					7
2½	−3.1	744	57	.42					212										

SUMMER

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Date	Min.	Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Date	Min.	Date	Number of observations
0.006	19.1	1015.5	80						20	2½	8.3	755	52	0.54					20
½	19.8	959.2	65	+0.14					20	3	6.1	711	47	.44					20
1	16.9	905	67	.58					20	4	0.3	629	35	.58					20
1½	13.6	852	64	.66					20	5	−5.4	556	28	.57					11
2	11.0	803	59	.52					20	6									

AUTUMN

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Date	Min.	Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Date	Min.	Date	Number of observations
0.006	7.6	1019.7	74						186	2½	−0.2	752	54	0.38					185
½	6.3	960.7	70	0.26					186	3	−2.3	707	51	.42					184
1	4.4	905	67	.38					186	4	−7.4	624	47	.51					178
1½	3.1	851	62	.26					185	5	−13.6	546	47	.62					110
2	1.7	801	58	.28					185	6									

WINTER

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Date	Min.	Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Date	Min.	Date	Number of observations
0.006	−2.5	1015.0	71						170	2½	−9.7	736	59	0.38					165
½	−4.0	953.0	70	0.30					170	3	−11.9	690	57	.44	11.6	Aug. 13, 18, 1935	−36.3	Jan. 17, 1934	165
1	−5.3	894	69	.26	21.5	Aug. 1, 1935	−27.2	Feb. 9, 1934	170	4	−17.0	604	55	.51	3.9	Aug. 18, 1935	−42.6	Jan. 30, 1934	155
1½	−6.3	838	65	.20					169	5	−23.0	528	53	.60	1.8	Oct. 1, 1933	−40.8	Nov. 16, 1933	95
2	−7.8	786	61	.30	16.2	Aug. 13, 1935	−29.6	Jan. 30, 1934	168	6									

TABLE 3.—*Data for the 29 stations mostly having only kite and airplane observations*—Continued

CHEYENNE, WYO.

SPRING

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes Max.	Date	Min.	Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes Max.	Date	Min.	Date	Number of observations
	°C.	mb	Percent	°C./100m	°C.		°C.				°C.	mb	Percent	°C./100m	°C.		°C.		
1.873	0.6	807.7	70						87	2½	0.3	748	60	0.16					87
½										3	−2.5	703	58	.56					87
1										4	−8.9	619	56	.64					87
1½										5	−15.7	544	54	.68					85
2	1.1	795.6	68	+0.39					87	6	−21.3	477	51	.56					1

SUMMER

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes Max.	Date	Min.	Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes Max.	Date	Min.	Date	Number of observations
1.873	14.1	814.0	66						153	2½	16.6	756	48	+0.16					153
½										3	13.6	713	45	.60					153
1										4	5.6	632	47	.80					153
1½										5	−2.9	559	54	.85					148
2	15.8	802.1	61	+1.34					153	6									

AUTUMN

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes Max.	Date	Min.	Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes Max.	Date	Min.	Date	Number of observations
1.873	3.7	812.5	63						181	2½	6.9	753	50	+0.18					181
½										3	4.1	708	48	.56					181
1										4	−2.7	625	47	.68					181
1½										5	−9.8	551	48	.71					179
2	6.0	800.8	59	+1.81					181	6									

WINTER

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes Max.	Date	Min.	Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes Max.	Date	Min.	Date	Number of observations
1.873	−3.4	810.4	62						121	2½	−0.7	750	53	+0.14					121
½										3	−3.6	705	53	.58	21.6	July 12, 1934	−29.2	Feb. 8, 1936	121
1										4	−9.8	620	51	.62	12.6	July 15, 1934	−36.6	do	121
1½										5	−16.6	544	49	.68	3.4	Aug. 4, 1934	−41.9	do	121
2	−1.4	798.7	59	+1.57	25.4	July 13, 1934	−34.7	Feb. 8, 1936	121	6	−26.6	475	55	1.00					1

CHICAGO, ILL.

SPRING

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes Max.	Date	Min.	Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes Max.	Date	Min.	Date	Number of observations
0.190	5.4	991.5	78						176	2½	−1.5	744	56	0.50					174
½	5.7	954.9	72	+0.10					176	3	−4.2	699	52	.54					173
1	4.6	898	66	.22					176	4	−10.2	614	48	.60					171
1½	3.1	844	62	.30					176	5	−16.9	539	44	.67					95
2	1.0	793	57	.42					175	6									

SUMMER

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes Max.	Date	Min.	Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes Max.	Date	Min.	Date	Number of observations
0.190	18.5	991.7	82						155	2½	10.5	751	52	0.58					154
½	20.4	956.8	66	+0.61					155	3	7.6	707	49	.58					154
1	19.7	902	57	.14					155	4	1.3	624	44	.63					152
1½	16.6	847	59	.62					155	5	−5.0	550	39	.63					107
2	13.4	798	58	.64					154	6									

AUTUMN

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes Max.	Date	Min.	Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes Max.	Date	Min.	Date	Number of observations
0.190	9.4	994.4	82						177	2½	3.1	750	51	0.46					175
½	9.8	958.1	72	+0.13					177	3	.5	706	50	.52					175
1	9.1	902	65	.14					177	4	−5.1	622	47	.56					171
1½	7.2	848	59	.38					177	5	−11.2	547	42	.61					115
2	5.4	798	54	.36					176	6									

WINTER

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes Max.	Date	Min.	Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes Max.	Date	Min.	Date	Number of observations
0.190	−1.7	994.1	82						174	2½	−5.5	735	50	0.38					173
½	−1.7	956.1	77	0.00					174	3	−8.0	695	48	.50	14.8	June 7, 1933	−33.7	Feb. 8, 1933	173
1	−2.0	897	69	.06	28.8	July 1, 1931	−32.7	Feb. 9, 1933	173	4	−13.4	610	46	.54	7.0	June 20, 1933	−37.2	do	161
1½	−2.4	842	60	.08					173	5	−19.9	534	44	.65	1.5	Aug. 7, 1931	−44.5	do	76
2	−3.6	790	54	.24	23.9	June 7, 1933	−28.1	Feb. 8, 1933	173	6	−29.5	467	43	.96			−23.7	Jan. 3, 1933	1

TABLE 3.—*Data for the 29 stations mostly having only kite and airplane observations*—Continued

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes Max.	Date	Min.	Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes Max.	Date	Min.	Date	Number of observations
	°C.	mb	Per cent	°C./100m	°C.		°C.				°C.	mb	Per cent	°C./100m	°C.		°C.		
CLEVELAND, OHIO																			
SPRING																			
0.245	4.8	986.5	79						271	2½	−1.6	746	59	0.42					263
½	5.9	957.9	72	+0.43					271	3	−4.1	701	58	.50					260
1	4.7	900	68	.24					271	4	−9.8	616	55	.57					248
1½	2.7	847	65	.40					209	5	−16.2	541	52	.64					204
2	.5	795	62	.44					265	6									----
SUMMER																			
0.245	17.8	986.3	82						259	2½	10.2	754	57	0.56					256
½	20.1	958.3	68	+0.90					259	3	7.6	710	51	.52					253
1	19.1	902	61	.20					259	4	2.0	627	45	.56					247
1½	16.1	851	64	.60					258	5	−3.8	553	41	.58					230
2	13.0	801	63	.62					256	6	−9.0	487	36	.52					24
AUTUMN																			
0.245	9.8	988.9	80						269	2½	3.2	752	53	0.42					254
½	11.0	959.9	72	+0.47					269	3	.9	708	51	.46					252
1	9.6	903	69	.28					268	4	−4.2	624	46	.51					250
1½	7.2	851	67	.48					264	5	−10.1	549	44	.59					219
2	5.3	800	59	.38					255	6	−15.7	483	50	.56					8
WINTER																			
0.245	−1.0	989.2	80						262	2½	−5.9	742	54	0.34					242
½	−.9	959.3	77	+0.04					262	3	−8.1	697	53	.44	14.0	July 2, 1931	−32.6	Feb. 9, 1933	236
1	−2.1	899	73	.24	27.8	July 23, 1933	−25.0	Feb. 9, 1933	260	4	−13.1	611	51	.50	9.4	July 5, 1931	−39.7	do.	222
1½	−3.1	845	65	.20					253	5	−19.3	535	50	.62	3.3	July 6, 1931	−35.6	Mar. 11, 1934	156
2	−4.2	792	58	.22	21.7	June 8, 1933	−27.4	Mar. 10, 1933	246	6							−13.7	Nov. 9, 1931	----
DREXEL, NEBR.																			
SPRING																			
0.396	9.1	966.9	66						903	2½	−0.6	748	54	0.52					549
½	8.4	954.8	65	0.67					903	3	−3.4	703	54	.56					418
1	6.0	899	61	.48					879	4	−9.2	619	53	.58					113
1½	4.2	846	57	.36					803	5	−15.2	544	52	.60					20
2	2.0	796	55	.44					697	6	−20.8	475	50	.56					6
SUMMER																			
0.396	22.9	968.2	68						813	2½	11.3	757	56	0.62					501
½	22.3	956.7	66	0.58					813	3	8.1	713	55	.64					382
1	19.9	903	61	.48					781	4	1.6	631	52	.65					123
1½	17.3	852	59	.52					718	5	−4.4	557	52	.60					15
2	14.4	803	57	.58					607	6	−10.2	491	50	.58					4
AUTUMN																			
0.396	10.9	970.0	66						868	2½	2.9	752	52	0.54					590
½	10.6	958.0	64	0.29					868	3	.1	706	52	.56					474
1	9.3	902	58	.26					851	4	−5.4	623	50	.55					172
1½	7.8	849	54	.30					794	5	−10.9	549	47	.55					26
2	5.6	799	52	.44					704	6	−16.6	------	43	.57					5
WINTER																			
0.396	−4.6	970.6	79						940	3	−9.2	697	53	0.50	17.4	Aug. 4, 1918	−31.9	Jan. 11, 1918	501
½	−4.7	957.9	76	0.10					939	4	−14.6	612	51	.54	7.6	June 10,	−34.6	do.	117
1	−3.6	899	64	+.22	34.2	Aug. 4, 1918	−32.6	Jan. 11, 1918	911							July 30, 1917			
1½	−3.2	844	57	+.08					849	5	−20.8	538	51	.62	0.2	Sept. 7, 1917	−29.0	Jan. 21, 1926	15
2	−4.5	792	54	.26	26.6	Aug. 4, 1918	−31.4	Jan. 11, 1918	765	6					−8.0	Sept. 4, 1925	−22.1	Nov. 25, 1918	----
2½	−6.7	743	53	.44					662										

TABLE 3.—*Data for the 29 stations mostly having only kite and airplane observations*—Continued

DUE WEST, S. C.

SPRING

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes Max.	Date	Min.	Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes Max.	Date	Min.	Date	Number of observations
	°C.	mb	Per cent	°C./100m	°C.		°C.				°C.	mb	Per cent	°C./100m	°C.		°C.		
0.217	15.6	992.3	64						866	2½	3.0	756	54	0.60					435
½	13.5	959.7	63	0.74					866	3	.4	711	50	.52					285
1	10.8	905	62	.54					815	4	−5.1	628	47	.55					76
1½	8.1	853	61	.54					704	5	−11.7	554	47	.66					13
2	5.5	803	58	.52					585	6									

SUMMER

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes Max.	Date	Min.	Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes Max.	Date	Min.	Date	Number of observations
0.217	25.9	992.1	68						602	2½	10.4	760	69	0.64					276
½	23.2	960.5	69	0.95					601	3	7.4	716	67	.60					189
1	20.2	906	69	.60					541	4	1.3	634	64	.61					51
1½	16.9	855	70	.66					437	5	−6.4	561	51	.47					5
2	13.6	806	70	.66					352	6									

AUTUMN

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes Max.	Date	Min.	Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes Max.	Date	Min.	Date	Number of observations
0.217	16.1	994.0	69						720	2½	6.2	756	51	0.44					338
½	14.6	961.3	66	0.53					720	3	3.9	711	47	.46					216
1	12.5	906	64	.42					667	4	−1.5	628	43	.54					46
1½	10.4	853	61	.42					554	5	−7.3	554	41	.58					8
2	8.4	803	56	.40					452	6									

WINTER

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes Max.	Date	Min.	Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes Max.	Date	Min.	Date	Number of observations
0.217	7.0	995.2	72						783	2½	0.5	752	48	0.42					358
½	6.8	961.6	65	0.07					782	3	−1.8	707	45	.46	21.2	Aug. 22, 1927	−17.4	Feb. 10, 1926	224
1	5.9	905	60	.18	27.2	Sept. 8, 1927	−11.0	Jan. 15, 1927	741	4	−7.1	624	44	.53	8.4	Sept. 16, 1927	−15.2	Apr. 18, 1923	39
1½	4.4	851	56	.30					624	5	−12.9	549	49	.58	0.8	Aug. 19, 1926	−22.4	Mar. 12, 1924	5
2	2.6	800	52	.36	24.2	Sept. 8, 1927	−15.0	Jan. 10, 1927	502	6									

EL PASO, TEX.

SPRING

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes Max.	Date	Min.	Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes Max.	Date	Min.	Date	Number of observations
1.194	14.3	880.7	37						92	2½	9.2	754	40	0.72					92
½										3	5.5	709	41	.74					92
1										4	−2.1	627	44	.76					91
1½	15.4	850	38	+0.36					92	5	−9.4	553	45	.73					85
2	12.8	801	38	.52					92	6									

SUMMER

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes Max.	Date	Min.	Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes Max.	Date	Min.	Date	Number of observations
1.194	23.8	882.1	55						61	2½	18.8	760	51	0.68					61
½										3	15.0	717	56	.76					61
1										4	6.9	636	70	.81					61
1½	24.8	852.8	49	+0.33					61	5	−.4	563	72	.73					61
2	22.2	806	48	.52					61	6									

AUTUMN

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes Max.	Date	Min.	Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes Max.	Date	Min.	Date	Number of observations
1.194	13.1	883.3	58						90	2½	12.0	757	41	0.56					90
½										3	8.9	713	41	.62					90
1										4	2.4	631	40	.65					90
1½	16.0	852.1	45	+0.95					90	5	−4.1	558	32	.65					83
2	14.8	804	42	.24					90	6									

WINTER

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes Max.	Date	Min.	Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes Max.	Date	Min.	Date	Number of observations
1.194	4.0	881.8	56						31	3	2.4	707	40	0.16	19.8	July 22, 1935	−8.5	Jan. 1, 1936	31
½										4	1.5	623	34	.09	10.0	July 22, 24, 25, 1935	−14.6	do	31
1																			
1½	4.1	850.3	49	+0.03					31	5	.8	549	29	.07	3.2	Sept. 17, 1935	−22.3	Jan. 1, 18, 1936	31
2	3.7	800	46	.08	28.2	July 22, 1935	−4.2	Jan. 19, 1936	31	6									
2½	3.2	752	45	.10					31										

TABLE 3.—*Data for the 29 stations mostly having only kite and airplane observations*—Continued

FARGO, N. DAK.

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes Max.	Date	Min.	Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes Max.	Date	Min.	Date	Number of observations
	°C.	mb	Per cent	°C./100m	°C.		°C.				°C.	mb	Per cent	°C./100m	°C.		°C.		
SPRING																			
0.274	0.9	982.9	82						92	2½	−5.4	744	59	0.48					92
½	2.2	956.7	75	+0.58					92	3	−7.9	699	55	.50					92
1	1.3	899	67	.18					92	4	−13.2	614	49	.53					92
1½	−.8	844	64	.42					92	5	−19.6	538	46	.64					91
2	−3.0	793	62	.44					92	6									
SUMMER																			
0.274	15.3	980.1	83						154	2½	9.9	755	51	0.58					154
½	17.8	954.7	67	+1.11					154	3	6.8	711	50	.62					154
1	17.7	901	57	.02					154	4	.4	629	46	.64					154
1½	15.5	850	55	.44					154	5	−6.3	556	43	.67					154
2	12.8	801	53	.54					154	6									
AUTUMN																			
0.274	3.0	983.3	81						179	2½	.7	747	52	0.46					177
½	5.6	956.4	73	+1.15					179	3	−1.9	702	50	.52					176
1	5.7	899	66	+.02					179	4	−7.5	618	48	.56					175
1½	4.7	845	59	.20					179	5	−13.6	544	47	.61					168
2	3.0	795	54	.34					177	6									
WINTER																			
0.274	−12.5	987.0	83						119	2½	−8.3	740	57	0.34					118
½	−11.7	957.9	81	+0.35					119	3	−10.4	694	55	.42	19.6	July 21, 1934	−35.5	Feb. 15, 1936	118
1	−8.8	897	74	+.58	28.5	July 20, 1935	−35.7	Jan. 22, 1936	119	4	−15.8	608	53	.54	10.0	do.	−39.8	do.	116
1½	−7.0	841	66	+.36					119	5	−22.2	532	51	.64	2.1	do.	−43.3	Feb. 4, 1936	111
2	−6.6	789	61	+.08	27.5	Aug. 15, 1935	−31.1	Feb. 14, 1936	119	6									

GALVESTON, TEX. (FORT CROCKETT)

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes Max.	Date	Min.	Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes Max.	Date	Min.	Date	Number of observations
SUMMER																			
0.003	26.7	1,015.6	85						56	2½	14.6	762	49	0.60					56
½	25.3	961.4	81	0.28					56	3	11.4	718	49	.64	14.7	Aug. 18, 1934	−1.6	Nov. 30, 1934	56
1	22.9	908	63	.48	28.5	July 18, 1934	2.4	Nov. 30, 1934	56	4	5.1	636	50	.63	9.5	Oct. 20, 1934	−3.6	do.	55
1½	20.5	857	53	.48					56	5	−1.6	562	54	.67	2.4	Oct. 19, 1934	−11.1	do.	4
2	17.6	809	51	.58	20.3	July 17, 1934	1.9	Nov. 30, 1934	56	6									
AUTUMN																			
0.003	22.9	1,015.9	84						58	2½	13.2	761	42	0.48					58
½	22.4	960.4	74	0.10					58	3	10.5	717	40	.54					58
1	19.6	906	67	.56					58	4	4.7	635	34	.58					58
1½	17.4	855	54	.44					58	5	−1.6	561	32	.63					39
2	15.6	807	44	.36					58	6	−10.2	494	31	.86					1

HURON, S. DAK.

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes Max.	Date	Min.	Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes Max.	Date	Min.	Date	Number of observations
SUMMER																			
0.398	27.8	968	53						5	7	−18.6	425	48	0.71	−15.4	Sept. 16, 1910	−26.0	Sept. 8, 1910	4
½	26.8	956	54	0.98					5	8	−25.3	371	46	.67	−22.4	do.	−33.0	Sept. 4, 8, 1910	4
1	22.7	902	57	.82	27.1	Aug. 12, 1910	7.4	Sept. 8, 1910	5	9	−32.1	321	46	.68	−30.7	do.	−41.8	Sept. 4, 1910	4
1½			63							10	−37.2	279	44	.51	−33.7	Sept. 5, 1910	−47.7	Sept. 8, 1910	3
2	15.3	801	61	.74	21.6	Sept. 16, 1910	2.8	Aug. 11, 1910	4	11	−41.3	241	42	.41	−35.9	do.	−53.1	do.	3
2½			54							12	−45.1	209	42	.38	−43.3	Sept. 9, 1910	−62.0	Aug. 11, 1910	3
3	8.9	712	52	.64	12.7	Sept. 16, 1910	0.9	Sept. 5, 1910	4	13	−45.2	180	42	.01	−44.1	do.	−67.9	do.	2
4	1.4	630	53	.75	5.4	Sept. 1, 1910	−5.8	Sept. 3, 1910	4	14	−45.3	157	41	.01	−46.3	Aug. 11, 1910	−63.7	do.	1
5	−4.8	554	50	.62	−1.7	Sept. 16, 1910	−11.9	do.	4	15					−50.1	Sept. 10, 1910	−63.3	Sept. 3, 1910	
6	−11.5	486	48	.67	−8.0	do.	−19.0	Sept. 8, 1910	4										
AUTUMN																			
0.398	21.3	968	54						16	14	−53.6	150	37	0.07					12
½	20.3	957	55	0.98					16	15	−54.6	127	36	.10					12
1	18.0	902	60	.86					16	16	−56.6	109	35	.20					12
1½			65							17	−56.5	93	35	+.01					9
2	11.2	806	60	.48					16	18	−55.0	79	35	+.15					8
2½			56							19	−52.6	67	35	+.24					8
3	6.0	707	51	.52					16	20	−51.1	57	35	+.15					6
4	−1.0	627	46	.70					16	21	−49.9	49	34	+.12					5
5	−8.2	550	44	.72					16	22	−48.0	41	33	+.19					5
6	−15.0	483	45	.68					15	23	−45.6	34	32	+.24					4
7	−21.6	422	44	.66					15	24	−42.2	29	32	+.34					4
8	−28.6	367	44	.70					15	25	−40.5	25	32	+.17					2
9	−35.9	318	43	.73					15	26	−39.3	21	31	+.12					2
10	−42.5	275	41	.66					15	27	−38.0	18	31	+.13					1
11	−47.7	237	39	.52					14	28	−38.4	14	31	.04					1
12	−50.7	204	38	.30					14	29	−38.8	11	31	.04					1
13	−52.9	175	37	.22					14	30	−39.1	8	31	.03					1

TABLE 3.—*Data for the 29 stations mostly having only kite and airplane observations*—Continued

LAKEHURST, N. J.

SPRING

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Date	Min.	Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Min.	Date	Max.	Date	Number of observations
	°C.	mb	Percent	°C./100m	°C.		°C.				°C.	mb	Percent	°C./100m	°C.		°C.		
0.003	6.4	1013.7	83						74	2½	−1.4	750	59	0.46					74
½	7.4	957.6	64	+0.20					74	3	−3.6	705	55	.44					72
1	5.4	902	63	.40					74	4	−8.6	621	48	.50					68
1½	3.2	848	63	.44					74	5	−13.6	547	44	.50					43
2	.9	798	61	.46					74										

SUMMER

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Date	Min.	Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Min.	Date	Max.	Date	Number of observations
0.003	19.6	1013.1	88						87	2½	9.8	757	64	0.48					87
½	20.1	958.9	71	+0.10					87	3	7.5	713	59	.46					86
1	17.7	905	70	.48					87	4	2.6	630	54	.49					85
1½	14.9	853	72	.56					87	5	−2.4	557	46	.50					53
2	12.2	804	69	.54					87										

AUTUMN

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Date	Min.	Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Min.	Date	Max.	Date	Number of observations
0.003	8.9	1,017.5	86						137	3	0.9	709	47	0.40					137
½	9.6	961.0	75	+0.14					137	4	−4.1	625	45	.50					122
1	7.7	904	73	.38					137	5	−10.0	549	40	.59					63
1½	6.6	851	66	.22					137	6									
2	5.0	801	58	.32					137	7									
2½	2.9	754	53	.42					137										

WINTER

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Date	Min.	Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Min.	Date	Max.	Date	Number of observations
0.003	−2.3	1,017.4	73						78	2½	−9.4	743	55	0.46					78
½	−2.4	959.1	69	0.02					78	3	−11.7	697	53	.46	13.3	Aug. 13, 1935	−32.0	Jan. 31, 1936	78
1	−4.4	901	68	.40	23.8	July 20, 1935	−19.7	Feb. 10, 1936	78	4	−16.9	610	48	.52	8.8	do.	−35.7	Jan. 28, 1936	72
1½	−5.6	845	63	.24					78	5	−24.6	530	45	.77	3.1	June 30, 1935	−32.0	Apr. 16, 1935	13
2	−7.1	793	59	.30	19.4	Aug. 2, 1935	−23.4	Jan. 24, 31, 1936; Feb. 10, 1936	78	6									
										7									

LEESBURG, GA.

SPRING

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Date	Min.	Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Min.	Date	Max.	Date	Number of observations
0.085	19.8	1,007.0	60						88	3	3.3	709	44	0.50					20
½	15.6	958.1	62	1.01					84	4	−2.8	627	47	.61					4
1	12.4	903	63	.64					65	5									
1½	10.0	851	57	.48					49	6									
2	8.4	801	47	.32					32	7									
2½	5.8	754	48	.52					25										

SUMMER

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Date	Min.	Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Min.	Date	Max.	Date	Number of observations
0.085	27.9	1,007.7	63						51	3	8.6	715	63	0.46					11
½	23.4	961.4	69	1.08					51	4	3.7	634	55	.49					8
1	19.4	907	75	.80					37	5									
1½	16.2	855	75	.64					27	6									
2	13.4	806	73	.56					24	7									
2½	10.9	759	66	.50					19										

AUTUMN

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Date	Min.	Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Min.	Date	Max.	Date	Number of observations
0.085	22.2	1,009.5	62						48	3	7.2	714	44	0.36					17
½	18.6	962.2	67	0.87					48	4	2.3	632	49	.49					7
1	15.7	907	68	.58					39	5									
1½	13.3	855	64	.48					32	6									
2	11.0	805	58	.46					25	7									
2½	9.0	758	49	.40					22										

WINTER

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Date	Min.	Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Min.	Date	Max.	Date	Number of observations
0.085	12.5	1,010.6	64						67	3	0.7	710	42	0.44	11.8	Apr. 19, 1920	−10.9	Mar. 6, 1920	27
½	9.5	961.7	64	0.72					66	4	−4.3	626	35	.50	4.6	Nov. 1, 1919	−4.6	Dec. 19, 1919	4
1	8.0	906	60	.30	23.6	Aug. 1, 1919	−7.5	Mar. 1, 1920	57	5		550	35						
1½	6.6	853	54	.28					49	6									
2	5.0	803	47	.32	17.2	Apr. 20, 1920	−10.0	Feb. 26, 1920	46	7									
2½	2.9	755	44	.42					39										

TABLE 3.—*Data for the 29 stations mostly having only kite and airplane observations*—Continued

MITCHEL FIELD, L. I., N. Y. (HEMPSTEAD)

SPRING

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Extremes: Date	Extremes: Min.	Extremes: Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Extremes: Date	Extremes: Min.	Extremes: Date	Number of observations
	°C.	mb	Percent	°C./100m	°C.		°C.				°C.	mb	Percent	°C./100m	°C.		°C.		
0.029	6.5	1,013.7	78						85	3	−3.3	703	56	0.44					84
½	7.5	957.3	66	+0.21					85	4	−8.6	619	53	.53					81
1	5.3	900	63	.44					85	5	−14.8	544	49	.62					48
1½	3.1	846	62	.44					84	6	−21.7	475	56	.69					1
2	1.2	796	60	.38					84	7									
2½	−1.1	748	57	.46					84										

SUMMER

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Extremes: Date	Extremes: Min.	Extremes: Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Extremes: Date	Extremes: Min.	Extremes: Date	Number of observations
0.029	18.6	1,013.5	91						130	3	6.6	714	58	0.50					127
½	19.8	959.9	71	+0.25					130	4	1.1	632	52	.55					121
1	17.3	906	70	.50					130	5	−4.9	558	46	.60					86
1½	14.5	854	71	.56					130	6									
2	11.7	805	68	.56					129	7									
2½	9.1	758	62	.52					128										

AUTUMN

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Extremes: Date	Extremes: Min.	Extremes: Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Extremes: Date	Extremes: Min.	Extremes: Date	Number of observations
0.029	10.4	1,016.4	88						150	3	.5	709	55	0.48					145
½	10.6	961.3	77	+0.04					150	4	−5.2	625	50	.57					122
1	8.7	905	73	.38					150	5	−11.3	551	47	.61					65
1½	7.0	852	68	.34					149	6									
2	5.1	802	62	.38					148	7									
2½	2.9	754	57	.44					147										

WINTER

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Extremes: Date	Extremes: Min.	Extremes: Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Extremes: Date	Extremes: Min.	Extremes: Date	Number of observations
0.029	−2.9	1,015.8	74						93	3	−11.3	694	56	0.46	13.4	Aug. 3, 1935	−28.4	Jan. 31, 1936	86
½	−3.6	957.0	70	0.15					93	4	−16.5	609	52	.52	9.3	do	−31.9	Jan. 28, 1936	75
1	−5.1	898	67	.30	24.8	July 31, 1934	−19.6	Jan. 24, 1936	93	5	−22.9	533	51	.64	4.4	do	−33.6	Feb. 20, 1935	41
1½	−6.0	842	63	.18					91	6									
2	−7.1	790	61	.22	18.7	July 27, 1934	−24.3	Jan. 24, 1936	91	7									
2½	−9.0	740	59	.38					90										

MAXWELL FIELD, ALA. (MONTGOMERY)

SPRING

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Extremes: Date	Extremes: Min.	Extremes: Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Extremes: Date	Extremes: Min.	Extremes: Date	Number of observations
0.052	15.8	1,008.2	80						81	9	−39.2	323		0.86					2
½	17.1	957.2	63	+0.29					81	10	−48.0	280		.88					2
1	14.4	903	61	.54					81	11	−53.8	242		.58					2
1½	11.1	851	60	.66					81	12	−60.5	207		.67					1
2	8.7	802	48	.48					81	13	−62.9	177		.24					1
2½	6.2	755	38	.50					81	14	−64.2	151		.13					1
3	3.2	710	36	.60					80	15	−67.6	128		.34					1
4	−3.0	627	31	.62					80	16	−71.0	109		.34					1
5	−9.9	553	29	.69					54	17	−71.7	92		.07					1
6	−15.9	485		.60					2	18	−71.9	77		.02					1
7	−22.4	425		.65					2	19	−72.1	65		.02					1
8	−30.6	371		.82					2										

SUMMER

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Extremes: Date	Extremes: Min.	Extremes: Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Extremes: Date	Extremes: Min.	Extremes: Date	Number of observations
0.052	23.7	1,010.1	88						140	3	9.9	717	64	0.58					137
½	24.4	960.2	72	+0.16					140	4	4.0	635	60	.59					135
1	21.9	907	70	.50					140	5	−1.8	562	54	.58					113
1½	18.7	856	71	.64					140	6									
2	15.7	808	69	.60					140	7									
2½	12.8	761	65	.58					139										

AUTUMN

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Extremes: Date	Extremes: Min.	Extremes: Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Extremes: Date	Extremes: Min.	Extremes: Date	Number of observations
0.052	15.0	1,012.6	86						171	3	6.9	713	40	0.50					165
½	17.9	961.1	63	+0.65					171	4	.7	630	38	.62					158
1	16.0	906	62	.38					171	5	−6.3	556	36	.70					86
1½	13.9	854	58	.42					170	6									
2	11.8	805	52	.42					170	7									
2½	9.4	757	45	.48					167										

WINTER

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Extremes: Date	Extremes: Min.	Extremes: Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Extremes: Date	Extremes: Min.	Extremes: Date	Number of observations
0.052	5.1	1,015.0	76						107	8	−29.2	368	29	0.78					3
½	6.9	961.2	63	+0.40					107	9	−37.6	320	28	.84					3
1	6.6	904	55	.06	27.0	July 23, 1934	−11.8	Feb. 27, 1935	107	10	−47.0	277	27	.94					3
1½	6.0	851	46	.12					107	11	−53.3	238	26	.63					3
2	4.4	800	41	.32	20.1	July 23, 1934	−9.4	Jan. 28, 1936	106	12	−56.7	204	25	.34					3
2½	2.5	752	38	.38					106	13	−59.7	175	24	.30					3
3	.3	707	36	.44	13.2	Aug. 7, 1934 Sept. 6, 1935	−12.8	Feb. 27, 1935	106	14	−60.4	150	23	.07					3
4	−5.0	623	31	.53	12.9	Mar. 12, 1936	−18.2	Mar. 17, 1936	104	15	−60.2	129	22	+.02					3
5	−10.8	549	31	.58	2.4	Aug. 23, 1935	−25.3	do	45	16	−59.8	111	22	+.04					2
6	−16.8	482	28	.60					3	17	−59.4	97	22	+.04					2
7	−21.4	422	29	.46					3	18	−59.0	85	22	+.04					2

TABLE 3.—*Data for the 29 stations mostly having only kite and airplane observations*—Continued

MURFREESBORO, TENN. (NASHVILLE)

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes Max.	Date	Min.	Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes Max.	Date	Min.	Date	Number of observations
	°C.	mb	Per cent	°C./100m	°C.		°C.				°C.	mb	Per cent	°C./100m	°C.		°C.		
SPRING																			
0.174	12.1	994.9	89						92	3	2.3	708	61	0.58					91
½	13.1	957.1	78	+0.31					92	4	−3.9	625	56	.62					90
1	12.0	902	75	.22					92	5	−10.4	550	54	.65					83
1½	9.8	850	72	.44					92	6									
2	7.6	800	67	.44					91	7									
2½	5.2	753	62	.48					91										
SUMMER																			
0.174	17.5	994.6	89						154	3	5.1	715	59	0.60					154
½	19.1	959.6	71	+0.49					154	4	−1.0	633	54	.61					154
1	17.1	906	70	.40					154	5	−7.1	559	49	.61					154
1½	14.0	855	72	.62					154	6									
2	11.1	806	68	.58					154	7									
2½	8.1	759	63	.60					154										
AUTUMN																			
0.174	12.1	998.5	84						180	2½	6.7	756	49	0.48					180
½	14.5	961.8	67	+0.74					180	3	4.2	711	45	.50					180
1	13.1	906	64	.28					180	4	−1.7	628	42	.59					180
1½	11.2	854	61	.38					180	5	−8.0	554	39	.63					173
2	9.1	804	54	.42					180										
WINTER																			
0.174	2.0	999.6	80						115	8	−36.5	361	59	0.71					2
½	2.3	960.2	75	+0.09					115	9	−43.7	313	59	.72					2
1	1.5	902	71	.16	29.2	July 24, 1934	−20.3	Jan. 23, 1936	115	10	−51.1	271	58	.74					2
1½	1.0	848	63	.10					115	11	−57.0	232	58	.59					2
2	0.0	797	66	.20	23.3	July 23, 1934	−22.7	Dec. 11, 1934	113	12	−56.9	199	55	+.01					1
2½	−2.0	748	63	.40					111	13	−56.9	172	54	.00					1
3	−4.1	703	60	.42	15.4	July 22, 1934	−23.8	Dec. 11, 1934	111	14	−57.2	147	53	.03					1
4	−9.0	618	57	.49	8.0	July 24, 1934	−26.1	Mar. 12, 1936	107	15	−61.0	127	53	.38					1
5	−15.1	543	57	.61	1.9	July 3, 1934	−30.9	Dec. 11, 1934	106	16	−62.0	109	53	.10					1
6	−22.6	476	59	.75					3	17	−62.4	94	53	.04					1
7	−29.4	415	59	.68					2	18	−61.9	80	53	+.05					1

NORFOLK, VA.

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes Max.	Date	Min.	Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes Max.	Date	Min.	Date	Number of observations
SPRING																			
0.003	12.3	1,016.6	69						379	3	−.1	708	48	0.50					288
½	11.7	958.6	61	0.12					379	4	−5.4	625	43	.53					72
1	9.7	903	57	.40					377	5	−11.1	551	40	.57					62
1½	7.3	850	55	.48					365	6									
2	4.8	800	53	.50					364	7									
2½	2.4	753	51	.48					291										
SUMMER																			
0.003	23.9	1,015.9	79						430	3	9.3	714	57	0.54					380
½	22.8	959.5	71	0.22					430	4	4.0	632	50	.53					144
1	20.7	906	66	.42					420	5	−1.4	559	42	.54					137
1½	17.8	854	65	.58					423	6	−7.7	493	30	.63					2
2	14.7	805	64	.62					423	7									
2½	12.0	758	61	.54					381										
AUTUMN																			
0.003	15.1	1,019.8	77						377	3	3.8	709	43	0.44					351
½	14.6	962.1	68	0.10					377	4	−1.4	626	37	.52					162
1	12.3	906	64	.46					376	5	−7.4	552	34	.60					139
1½	10.2	852	59	.42					372	6									
2	8.1	802	55	.42					371	7									
2½	6.0	754	49	.42					352										
WINTER																			
0.003	4.5	1,020.1	71						287	2½	−2.0	745	47	0.38					239
½	4.0	960.0	64	0.10					287	3	−3.9	699	44	.38	16.9	Aug. 2, 1935	−19.8	Jan. 24, 1936	238
1	2.6	901	59	.28	29.4	Aug. 2, 1935	−16.0	Jan. 24, 1935 Jan. 24, 1936	284	4	−8.9	615	41	.50	9.8	Aug. 2, 1935	−27.4	Feb. 20, 1935	100
1½	1.3	846	55	.26					269	5	−14.8	540	40	.59	4.4	Aug. 13, 1935	−30.0	Nov. 12, 1934	49
2	−.1	795	50	.28	23.0	Aug. 2, 1935	−18.1	Jan. 24, 1936	269	6									
										7									

TABLE 3.—*Data for the 29 stations mostly having only kite and airplane observations*—Continued

OKLAHOMA CITY, OKLA.

SPRING

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes Max.	Date	Min.	Date	Number of observations
	°C.	mb	Percent	°C./100m	°C.		°C.		
0.391	12.1	966.9	72						89
½	12.3	954.5	69	+0.18					89
1	12.5	900	57	+.04					89
1½	11.6	847	49	.18					89
2	9.6	798	45	.40					88
2½	6.6	751	42	.60					86
3	3.1	707	42	.70					86
4	−4.5	624	44	.76					82
5	−12.2	550	45	.77					76
6	−20.4	483		.82					1
7	−29.6	422		0.92					1
8	−34.6	367		.50					1
9	−37.8	319		.32					1
10	−36.2	277		+.16					1
11	−38.7	241		.25					1
12	−43.1	210		.44					1
13	−48.5	182		.54					1
14	−52.1	158		.36					1
15	−53.2	136		.11					1

SUMMER

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes Max.	Date	Min.	Date	Number of observations
0.391	23.3	968.8	74						152
½	24.5	957.1	68	+1.10					152
1	24.4	904	61	.02					152
1½	21.4	854	60	.60					152
2	18.2	806	60	.64					152
2½	15.0	760	58	0.64					152
3	11.6	717	58	.68					151
4	4.7	636	57	.69					149
5	−1.7	562	56	.64					138

AUTUMN

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes Max.	Date	Min.	Date	Number of observations
0.391	12.7	971.6	84						178
½	13.8	959.5	78	+1.01					178
1	15.0	905	65	+.24					178
1½	13.4	853	61	.32					175
2	11.2	804	58	.44					173
2½	8.6	757	54	.52					173
3	5.7	713	50	.58					173
4	−0.7	630	46	.64					168
5	−7.1	556	41	.64					164

WINTER

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes Max.	Date	Min.	Date	Number of observations
0.391	2.2	973.8	75						113
½	3.5	960.9	71	+1.19					113
1	5.3	903	60	.36	30.4	Aug. 13, 1934	−20.2	Jan. 21, 1935	113
1½	4.6	849	53	.14					113
2	2.9	798	48	.34	23.7	Aug. 1, 1934	−15.0	Feb. 26, 1935	113
2½	0.6	750	45	.46					113
3	−2.2	705	44	.56	16.2	July 10, 1934; Aug. 1, 1934	−18.7	Jan. 21, 1935	113
4	−7.9	620	42	.57	9.3	July 29, 1935	23.2	Jan. 21, 1935	112
5	−15.0	545	41	.71	3.5	Aug. 5, 1934	−26.8	Dec. 20, 1934	104
6	−23.2	476	34	.82					3
7	−30.9	414	26	.77					2
8	−37.4	358	18	.65					2
9	−39.9	310	14	.25					2
10	−41.8	269		.19					1
11	−42.7	232		.09					1
12	−44.8	201		.21					1
13	−48.1	174		.33					1
14	−51.4	150		.33					1
15	−64.6	130		.32					1
16	−65.4	112		.08					1

PEMBINA, N. DAK.

SPRING

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes Max.	Date	Min.	Date	Number of observations
0.243	−0.8	986.0	82						92
½	.7	955.1	70	+0.58					92
1	.4	898	63	.06					92
1½	−1.4	844	60	.36					92
2	−3.4	792	57	.40					92
2½	−5.8	743	54	.48					92
3	−8.6	697	53	.56					92
4	−14.0	612	51	.54					92
5	−20.4	536	51	.64					89
6	−25.8	469	53	.54					1
7									

SUMMER

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes Max.	Date	Min.	Date	Number of observations
0.243	13.8	983.0	78						64
½	16.0	954.9	70	+0.86					64
1	14.9	901	66	.22	27.9	May 28, 1934	−35.6	Dec. 28, 1933	64
1½	12.3	840	63	.52					64
2	9.9	799	60	.48	21.2	June 27, 1934	−35.0	Dec. 26, 1933	64
2½	7.1	752	59	.56					64
3	4.4	708	56	.54	15.2	June 27, 1934	−39.2	Dec. 26, 1933	64
4	−1.5	625	52	.59	6.8	Aug. 6, 1933	−36.5	Feb. 26, 1934	64
5	−7.8	553	45	.63	−2.3	June 26, 1934	−42.0	Feb. 25, 1934	62
6	−14.5	486	46	.67					4
7	−19.8	427	33	.48					4
8	−25.4	322	28	.61					4
9	−32.6	324	25	.72					4
10	−87.7	281	22	.51					4
11	−41.8	243	21	.41					4
12	−46.0	210	20	.42					4
13	−50.1	181	19	.41					4
14	−50.9	155	18	.08					4
15	−53.0	133	18	.21					4
16	−53.0	114	18	.00					4
17	−53.6	97	17	.06					4
18	−51.2	83	17	+.24					3
19	−50.9	71		+.03					3
20	−48.5	61		+.24					2
21	−46.4	53		+.21					1
22	−44.1	45		+.23					1

TABLE 3.—*Data for the 29 stations mostly having only kite and airplane observations*—Continued

PEMBINA, N. DAK.—Continued

AUTUMN

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Extremes: Date	Extremes: Min.	Extremes: Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Extremes: Date	Extremes: Min.	Extremes: Date	Number of observations
	°C.	mb	Per cent	°C./100m	°C.		°C.				°C.	mb	Per cent	°C./100m	°C.		°C.		
0.243	1.4	983.5	83						90	3	−6.0	697	56	0.50					90
½	2.8	954.2	74	+0.54					90	4	−11.5	613	52	.55					90
1	2.5	897	68	.06					90	5	−17.7	538	49	.62					87
1½	1.2	843	61	.26					90	6									
2	−.8	791	58	.40					90	7									
2½	−3.5	742	58	.54					90										

WINTER

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Extremes: Date	Extremes: Min.	Extremes: Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Extremes: Date	Extremes: Min.	Extremes: Date	Number of observations
0.243	−17.7	990.4	85						87	3	−14.9	689	55	0.44					87
½	−15.5	957.6	76	+0.86					87	4	−20.0	602	53	.51					86
1	−12.4	898	70	+.62					87	5	−26.1	526	51	.61					83
1½	−10.6	841	66	+.36					87	6									
2	−11.1	787	62	.10					87	7									
2½	−12.7	736	57	.32					87										

PENSACOLA, FLA.

SPRING

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Extremes: Date	Extremes: Min.	Extremes: Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Extremes: Date	Extremes: Min.	Extremes: Date	Number of observations
0.002	18.0	1,016.8	80						454	3	5.4	711	44	0.50					390
½	16.6	958.6	72	0.28					454	4	−.6	629	37	.60					167
1	14.5	904	65	.42					453	5	−7.1	556	35	.65					108
1½	12.4	852	59	.42					451	6									
2	10.4	803	53	.40					451	7									
2½	7.9	755	49	.50					390										

SUMMER

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Extremes: Date	Extremes: Min.	Extremes: Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Extremes: Date	Extremes: Min.	Extremes: Date	Number of observations
0.002	25.3	1,017.8	84						553	3	9.3	713	62	0.58					520
½	23.6	961.0	78	0.34					553	4	3.5	631	59	.58					264
1	20.9	906	74	.54					553	5	−2.1	557	53	.56					188
1½	18.1	854	72	.56					553	6									
2	15.1	805	69	.60					553	7									
2½	12.2	757	65	.58					520										

AUTUMN

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Extremes: Date	Extremes: Min.	Extremes: Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Extremes: Date	Extremes: Min.	Extremes: Date	Number of observations
0.002	18.3	1,020.1	82						490	3	6.8	710	49	0.50					469
½	18.0	962.0	74	0.06					490	4	1.3	627	43	.55					283
1	16.0	906	69	.40					490	5	−4.6	553	39	.59					195
1½	13.9	853	64	.42					488	6									
2	11.7	803	58	.44					487	7									
2½	9.3	755	53	.48					469										

WINTER

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Extremes: Date	Extremes: Min.	Extremes: Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Extremes: Date	Extremes: Min.	Extremes: Date	Number of observations
0.002	10.0	1,021.4	81						370	3	2.2	705	46	0.44	15.4	May 18, 1935	−11.5	Feb. 1, 1935	315
½	10.3	961.0	72	+0.06					370	4	−2.9	622	39	.51	9.0	do	−15.4	do	135
1	9.3	904	65	.20	29.1	Aug. 10, 1935	−11.5	Dec. 11, 1934	369	5	−8.6	548	37	.57	2.5	Aug. 19, 1934	−15.6	Dec. 3, 1935	60
1½	8.0	850	58	.26					367	6									
2	6.4	799	52	.32	18.8	July 25, 1934	−6.9	Feb. 17, 1935	367	7									
2½	4.4	750	49	.40					315										

PHILADELPHIA, PA.

SUMMER

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Extremes: Date	Extremes: Min.	Extremes: Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Extremes: Date	Extremes: Min.	Extremes: Date	Number of observations
0.012	21.7	1,016.0	79						59	3	5.8	701	49	0.48	15	July 16, 1934	−6	Aug. 29, 1934	59
½	20.5	950.4	69	0.25					59	4	−.1	621	39	.59	9	do	−9	Aug. 27, 1934	58
1	18.1	898	63	.48	32	July 15, 1934	11	Aug. 27, 31, '34	59	5	−5.9	546	33	.58	6	do	−14	Aug. 29, 1934	53
1½	14.8	845	61	.66					59	6	−12.9	471	43	.70					1
2	11.5	792	63	.66	21	July 15, 1934	3	Aug. 30, 1934	59	7									
2½	8.2	746	56	.66					59										

AUTUMN

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Extremes: Date	Extremes: Min.	Extremes: Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Extremes: Date	Extremes: Min.	Extremes: Date	Number of observations
0.012	19.1	1,019.0	86						20	3	6.9	701	54	0.48					19
½	18.1	959.7	79	0.20					20	4	1.1	621	48	.58					19
1	16.0	902	78	.42					20	5	−5.3	549	40	.64					18
1½	13.9	852	65	.42					19	6	−14.5	471	36	.92					1
2	12.1	796	61	.36					19	7									
2½	9.3	750	60	.56					19										

TABLE 3.—*Data for the 29 stations mostly having only kite and airplane observations*—Continued

SAN ANTONIO, TEX. (KELLY FIELD)

SPRING

Altitude (km)	Temperature (°C.)	Pressure (mb)	Humidity (Percent)	Lapse rate (°C./100m)	Extremes: Max. (°C.)	Date	Min. (°C.)	Date	Number of observations
0.206	17.0	989.8	88						85
½	17.6	956.0	79	+0.20					85
1	17.2	902	69	.08					85
1½	16.2	850	56	.20					85
2	14.1	801	48	.42					83
2½	11.9	754	42	.44					83
3	8.7	710	39	0.64					82
4	1.6	628	38	.71					76
5	−5.7	555	37	.73					63
6	−15.2	488	35	.95					1
7									

SUMMER

Altitude (km)	Temperature (°C.)	Pressure (mb)	Humidity (Percent)	Lapse rate (°C./100m)	Extremes: Max. (°C.)	Date	Min. (°C.)	Date	Number of observations
0.206	23.5	991.3	91						151
½	23.7	959.3	86	+0.07					151
1	22.1	906	72	.32					151
1½	19.9	855	63	.44					151
2	17.0	807	62	.58					151
2½	14.0	760	58	.60					151
3	11.1	716	56	0.58					150
4	4.8	635	53	.63					147
5	−1.4	561	51	.62					110
6									
7									

AUTUMN

Altitude (km)	Temperature (°C.)	Pressure (mb)	Humidity (Percent)	Lapse rate (°C./100m)	Extremes: Max. (°C.)	Date	Min. (°C.)	Date	Number of observations
0.206	17.3	993.0	90						164
½	19.3	960.5	80	+0.68					164
1	18.4	906	71	.18					164
1½	16.0	854	65	.48					164
2	13.6	805	58	.48					163
2½	11.3	758	50	.46					163
3	8.5	714	44	0.56					162
4	2.4	632	36	.61					154
5	−4.4	559	32	.68					104
6									
7									

WINTER

Altitude (km)	Temperature (°C.)	Pressure (mb)	Humidity (Percent)	Lapse rate (°C./100m)	Extremes: Max. (°C.)	Date	Min. (°C.)	Date	Number of observations
0.206	8.4	996.1	82						106
½	11.0	962.0	68	+0.88					106
1	10.7	906	59	.06	27.0	July 24, 1934	−13.3	Jan. 21, 1935	106
1½	9.8	853	50	.18					105
2	8.3	803	43	.30	22.5	May 1, 1935	−5.0	Feb. 17, 1935	105
2½	6.1	755	40	.44					104
3	3.8	710	37	.46	17.4	June 21, 1935	−14.6	Feb. 17, 1935	104
4	−2.1	627	33	.59	8.4	Sept. 29, 1934	−19.4	do	102
5	−9.0	553	31	.69	3.2	Sept. 26, 1934	−17.5	Dec. 20, 1934	84
6	−14.5	485	29	0.55					2
7	−17.3	425	29	.28					2
8	−23.0	371	29	.57					2
9	−32.2	323	28	.92					1
10	−42.8	281	28	1.06					1
11	−53.5	243	26	1.07					1
12	−59.2		26	.57					1
13	−63.4		27	.42					1
14	−67.6		28	.42					1

SAN DIEGO, CALIF.

SPRING

Altitude (km)	Temperature (°C.)	Pressure (mb)	Humidity (Percent)	Lapse rate (°C./100m)	Extremes: Max. (°C.)	Date	Min. (°C.)	Date	Number of observations
0.010	16.0	1014.5	71						442
½	13.5	956.7	73	0.51					442
1	12.8	901	60	.14					442
1½	11.1	848	50	.34					437
2	9.4	798	39	.34					437
2½	6.8	750	34	.52					331
3	4.1	705	30	0.54					331
4	−2.0	622	26	.61					175
5	−9.1	548	25	.71					82
6									
7									

SUMMER

Altitude (km)	Temperature (°C.)	Pressure (mb)	Humidity (Percent)	Lapse rate (°C./100m)	Extremes: Max. (°C.)	Date	Min. (°C.)	Date	Number of observations
0.010	20.2	1012.0	77						482
½	17.9	955.7	79	0.47					482
1	21.0	902	49	+.62					482
1½	21.0	850	36	.00					468
2	19.8	802	28	.24					468
2½	17.1	756	29	.54					386
3	14.2	713	30	0.58					386
4	7.4	632	32	.68					233
5	0.5	559	30	.69					152
6									
7									

AUTUMN

Altitude (km)	Temperature (°C.)	Pressure (mb)	Humidity (Percent)	Lapse rate (°C./100m)	Extremes: Max. (°C.)	Date	Min. (°C.)	Date	Number of observations
0.010	17.2	1014.0	74						487
½	16.8	957.0	68	0.08					487
1	17.6	902	49	+.16					485
1½	16.0	850	40	.32					479
2	14.0	801	33	.40					478
2½	11.4	754	30	.52					392
3	8.5	710	28	0.58					392
4	2.2	628	27	.63					265
5	−4.2	554	24	.64					183
6	−9.8	496	28	.56					1
7									

WINTER

Altitude (km)	Temperature (°C.)	Pressure (mb)	Humidity (Percent)	Lapse rate (°C./100m)	Extremes: Max. (°C.)	Date	Min. (°C.)	Date	Number of observations
0.010	12.1	1016.8	73						433
½	12.5	958.8	63	+.08					433
1	11.2	903	54	.26	32.0	July 27, 1934	1.5	Mar. 22, 1935	433
1½	8.9	850	47	.46					418
2	6.6	799	41	.46	27.0	July 12, 1934	−6.7	Jan. 19, 1935	418
2½	4.2	751	36	.48					358
3	1.7	706	32	0.50	19.9	July 15, 1934	−12.9	Mar. 10, 1935	358
4	−4.5	622	30	.62	12.0	June 20, 1935	−21.1	do	193
5	−10.9	547	28	.64	5.6	July 6, 1934	−24.9	Dec. 5, 1934	119
6									
7									

TABLE 3.—*Data for the 29 stations mostly having only kite and airplane observations*—Continued

SEATTLE, WASH.

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes Max.	Date	Min.	Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes Max.	Date	Min.	Date	Number of observations
	°C.	mb	Percent	°C./100m	°C.		°C.				°C.	mb	Percent	°C./100m	°C.		°C.		
SPRING																			
0.008	10.7	1,017.4	72						188	3	−5.2	704	55	0.52					177
½	8.3	960.0	71	0.49					188	4	−10.9	619	51	.57					113
1	5.8	903	68	.50					188	5	−17.2	543	49	.63					42
1½	3.0	849	65	.56					185	6									
2	.1	798	63	.58					184	7									
2½	−2.6	750	59	.54					177										
SUMMER																			
0.008	16.5	1,017.4	74						179	3	3.5	710	53	0.46					160
½	13.9	961.1	75	0.53					179	4	−1.7	627	46	.52					102
1	12.3	905	71	.32					179	5	−7.6	553	42	.59					45
1½	10.2	852	68	.42					179	6									
2	8.0	802	65	.44					179	7									
2½	5.8	755	59	.44					160										
AUTUMN																			
0.008	12.2	1,018.5	79						121	3	0.2	702	50	0.44					119
½	10.6	958.8	75	0.33					121	4	−5.0	619	46	.52					71
1	8.8	901	71	.36					121	5	−11.3	545	47	.63					36
1½	6.7	847	65	.42					121	6	−19.3		51	.80					1
2	4.6	796	59	.42					121	7									
2½	2.4	748	55	.44					119										
WINTER																			
0.008	6.2	1,019.4	78						106	3	−7.8	702	55	0.58	16.9	Sept. 27, 1935	−20.6	Feb. 13, 1936	97
½	5.3	960.3	72	0.18					106	4	−13.3	617	53	.55	9.0	do.	−26.8	do.	72
1	3.3	902	68	.40	28.7	July 14, 1935	−15.0	Feb. 13, 1936	106	5	−20.0	541	54	.67	2.5	do.	−32.5	Mar. 9, 1936	15
1½	.7	847	65	.52					105	6									
2	−2.0	796	63	.54	24.1	July 14, 1935	−17.3	Feb. 13, 1936	104	7									
2½	−4.9	748	59	.58					97										

SELFRIDGE FIELD, MICH. (MT. CLEMENS NEAR DETROIT)

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes Max.	Date	Min.	Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes Max.	Date	Min.	Date	Number of observations
SPRING																			
0.190	3.4	995.3	80						89	3	−3.8	701	47	0.46					87
½	5.2	957.2	67	+0.58					89	4	−9.4	617	43	.56					84
1	3.7	900	64	.30					89	5	−16.1	542	38	.67					65
1½	2.0	846	61	.34					89	6									
2	.2	795	54	.36					88	7									
2½	−1.5	746	49	.34					87										
SUMMER																			
0.190	17.8	994.1	84						148	3	6.8	713	53	0.54					147
½	19.9	958.5	65	+0.68					148	4	1.2	630	47	.56					146
1	17.8	905	64	.42					148	5	−4.9	556	44	.61					142
1½	14.9	853	64	.58					148	6									
2	12.2	804	62	.54					147	7									
2½	9.5	757	58	.54					147										
AUTUMN																			
0.190	9.0	996.9	84						170	3	1.6	708	46	0.48					168
½	11.3	960.4	70	+0.74					170	4	−3.8	624	42	.54					167
1	9.8	904	66	.30					170	5	−9.6	549	39	.58					158
1½	8.0	851	61	.36					169	6									
2	6.1	801	54	.38					169	7									
2½	4.0	753	49	.42					169										
WINTER																			
0.190	−5.8	997.6	81						77	3	−12.0	696	46	0.42	14.4	July 23, 1934	−24.4	Dec. 10, 1934	71
½	−5.9	959.0	77	0.03					77	4	−17.0	610	46	.50	9.3	do.	−33.1	do.	68
1	−6.8	900	72	.18	26.7	July 24, 1934	−21.6	Jan. 24, 1935	77	5	−22.9	533	45	.59	2.4	July 24, 1934	−31.4	Dec. 22, 1934	38
1½	−7.2	844	62	.08					76	6									
2	−8.2	792	53	.20	21.8	July 22, 1934	−22.0	Jan. 24, 1935	71	7									
2½	−9.9	742	47	.34					71										

TABLE 3.—*Data for the 29 stations mostly having only kite and airplane observations*—Continued

SPOKANE, WASH.

SPRING

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Extremes: Date	Extremes: Min.	Extremes: Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Extremes: Date	Extremes: Min.	Extremes: Date	Number of observations
	°C.	mb	Percent	°C./100m	°C.		°C.				°C.	mb	Percent	°C./100m	°C.		°C.		
0.596	7.0	944.7	63						91	3	−8.1	700	63	0.68					90
½										4	−14.3	614	57	.62					86
1	4.9	899.5	62	0.52					91	5	−21.1	538	52	.68					42
1½	2.3	846	60	.52					91	6									
2	−1.3	795	60	.72					90	7									
2½	−4.7	746	62	.68					90										

SUMMER

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Extremes: Date	Extremes: Min.	Extremes: Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Extremes: Date	Extremes: Min.	Extremes: Date	Number of observations
0.596	14.8	944.8	59						131	3	5.4	711	39	0.72					130
½										4	−.9	628	36	.63					130
1	18.7	902.1	45	+0.97					131	5	−8.6	554	34	.77					116
1½	16.8	851	43	.38					131	6	−15.9	487	32	.73					9
2	13.0	802	41	.76					131	7									
2½	9.0	755	38	.80					130										

AUTUMN

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Extremes: Date	Extremes: Min.	Extremes: Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Extremes: Date	Extremes: Min.	Extremes: Date	Number of observations
0.596	6.6	947.1	76						170	3	−0.1	707	57	0.56					165
½										4	−6.0	623	54	.59					159
1	8.9	902.6	65	+0.57					170	5	−12.5	548	52	.65					149
1½	7.8	850	60	.22					170	6	−19.5	481	51	.70					4
2	5.4	800	59	.48					169	7									
2½	2.7	752	59	.54					167										

WINTER

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Extremes: Date	Extremes: Min.	Extremes: Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Extremes: Date	Extremes: Min.	Extremes: Date	Number of observations
0.596	0.0	948.7	85						91	3	−3.4	700	60	0.52	17.9	July 15, 1935	−27.6	Feb. 7, 1936	89
½										4	−9.5	615	57	.61	9.5	July 14, 15, 1935	−34.9	do	86
1	1.1	902.4	81	+0.27	29.6	Sept. 9, 1935	−22.9	Feb. 15, 1936	91	5	−16.3	539	54	.68	2.2	July 14, 1935	−42.4	do	68
1½	2.1	847	71	+.20					91	6									
2	1.2	795	65	.18	26.4	July 28, 1934	−23.8	Feb. 7, 1936	91	7									
2½	−.8	746	63	.40					90										

SUNNYVALE, CALIF.

SPRING

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Extremes: Date	Extremes: Min.	Extremes: Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Extremes: Date	Extremes: Min.	Extremes: Date	Number of observations
0.006	14.2	1,015.8	70						174	3	0.3	703	41	0.62					166
½	11.2	957.7	71	0.61					174	4	−6.2	619	37	.65					122
1	9.8	901	63	.28					173	5	−13.0	544	35	.68					54
1½	8.4	847	52	.28					171	6	−21.5	478	32	.85					1
2	6.3	797	46	.42					171	7									
2½	3.4	748	43	.58					166										

SUMMER

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Extremes: Date	Extremes: Min.	Extremes: Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Extremes: Date	Extremes: Min.	Extremes: Date	Number of observations
0.006	17.6	1,014.0	72						187	3	10.8	711	26	0.74					179
½	15.3	956.3	75	0.47					187	4	3.4	630	24	.74					127
1	18.2	901	53	+.58					187	5	−3.8	556	22	.72					56
1½	18.7	849	37	+.10					186	6									
2	17.0	801	31	.34					186	7									
2½	14.5	754	28	.50					181										

AUTUMN

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Extremes: Date	Extremes: Min.	Extremes: Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Extremes: Date	Extremes: Min.	Extremes: Date	Number of observations
0.006	15.9	1,016.1	73						169	3	6.9	709	27	0.70					166
½	14.3	958.3	72	0.32					169	4	0.0	626	22	.69					141
1	16.2	902	51	+.38					169	5	−6.9	552	21	.69					74
1½	15.5	849	38	.14					169	6									
2	13.3	800	33	.44					169	7									
2½	10.4	753	30	.58					167										

WINTER

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Extremes: Date	Extremes: Min.	Extremes: Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Extremes: Date	Extremes: Min.	Extremes: Date	Number of observations
0.006	9.6	1,019.7	77						135	3	−0.2	705	39	0.54	17.3	Aug. 21, 24, 1934	−16.5	Mar. 21, 1935	129
½	9.3	962.2	68	0.06					135	4	−6.4	621	37	.62	11.8	July 29, 1935	−24.7	do	103
1	8.6	905	60	.14	30.6	Oct. 10, 1934	−0.8	Mar. 8, 1935	135	5	−12.3	546	37	.59	5.3	do	−32.3	do	62
1½	7.0	851	53	.32					135	6									
2	4.9	800	47	.42	29.4	Oct. 10, 1934	−9.2	Mar. 21, 1935	134	7									
2½	2.5	751	42	.48					130										

TABLE 3.—*Data for the 29 stations mostly having only kite and airplane observations*—Continued

WASHINGTON, D. C. (ANACOSTIA)

SPRING

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Extremes: Date	Extremes: Min.	Extremes: Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Extremes: Date	Extremes: Min.	Extremes: Date	Number of observations
	°C.	mb	Per cent	°C./100m	°C.		°C.				°C.	mb	Per cent	°C./100m	°C.		°C.		
0.002	10.8	1016.5	66						589	3	−1.1	701	50	0.42					425
½	9.1	956.9	61	0.34					579	4	−6.4	618	46	.53					155
1	7.1	900	58	.40					574	5	−12.6	546	44	.62					59
1½	5.0	845	57	.42					534	6	−18.5	478	49	.59					2
2	3.0	794	56	.40					534	7									
2½	1.0	747	53	.40					426										

SUMMER

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Extremes: Date	Extremes: Min.	Extremes: Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Extremes: Date	Extremes: Min.	Extremes: Date	Number of observations
0.002	22.8	1,015.5	74						636	3	8.2	712	57	0.54					553
½	21.4	958.7	67	0.28					636	4	2.7	630	50	.55					284
1	19.4	904	63	.40					630	5	−3.1	556	45	.58					146
1½	16.7	852	64	.54					601	6	−10.0	489	42	.69					2
2	13.9	803	64	.56					601	7									
2½	10.9	756	61	.60					553										

AUTUMN

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Extremes: Date	Extremes: Min.	Extremes: Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Extremes: Date	Extremes: Min.	Extremes: Date	Number of observations
0.002	13.0	1,019.2	76						602	3	2.9	705	46	0.42					470
½	12.5	960.2	66	0.10					600	4	−2.2	621	42	.51					202
1	10.8	903	62	.34					596	5	−7.8	545	35	.56					140
1½	8.9	849	59	.38					565	6									
2	6.9	799	56	.40					564	7									
2½	5.0	751	51	.38					471										

WINTER

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Extremes: Date	Extremes: Min.	Extremes: Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Extremes: Date	Extremes: Min.	Extremes: Date	Number of observations
0.002	0.8	1,020.1	71						443	2½	−4.7	743	49	0.36					299
½	.7	958.8	63	0.02					440	3	−6.4	696	46	.34	18.8	July 7, 1934	−25.4	Jan. 23, 1936	298
1	−.5	899	59	.24	26.9	Aug. 12, 1926	−22.2	Jan. 23, 1936	439	4	−11.0	611	45	.46	10.3	July 23, 1934	−28.5	Jan. 28, 1936	103
						June 27, 1935				5	−16.4	535	44	.54	4.3	July 11, 1935	−32.3	Dec. 11, 1934	68
1½	−1.7	843	56	.24					411	6									
2	−2.9	791	52	.24	21.0	July 22, 1934	−23.8	Jan. 23, 1936	411	7									

WRIGHT FIELD, OHIO (DAYTON)

SPRING

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Extremes: Date	Extremes: Min.	Extremes: Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Extremes: Date	Extremes: Min.	Extremes: Date	Number of observations
0.244	7.1	987.3	80						81	3	−1.0	706	52	0.50					79
½	8.2	957.5	72	+0.43					81	4	−6.5	622	47	.55					77
1	7.8	902	65	.08					81	5	−13.0	547	46	.65					66
1½	5.8	849	64	.40					80	6									
2	3.7	799	60	.42					80	7									
2½	1.5	751	55	.44					79										

SUMMER

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Extremes: Date	Extremes: Min.	Extremes: Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Extremes: Date	Extremes: Min.	Extremes: Date	Number of observations
0.244	18.7	987.1	88						153	3	8.5	713	54	0.54					151
½	20.8	958.4	72	+0.82					153	4	2.6	631	50	.59					148
1	19.8	904	65	.20					153	5	−3.3	557	44	.59					120
1½	16.8	853	67	.60					153	6									
2	14.0	804	62	.56					153	7									
2½	11.2	757	57	.56					153										

AUTUMN

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Extremes: Date	Extremes: Min.	Extremes: Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Extremes: Date	Extremes: Min.	Extremes: Date	Number of observations
0.244	8.7	991.0	86						162	3	2.5	709	42	0.48					150
½	11.2	961.4	72	+0.98					162	4	−3.2	626	41	.57					144
1	11.1	905	62	.02					162	5	−9.3	551	37	.61					118
1½	9.0	852	58	.42					160	6									
2	7.1	802	50	.38					157	7									
2½	4.9	754	45	.44					155										

WINTER

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Extremes: Date	Extremes: Min.	Extremes: Date	Number of observations	Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Extremes: Max.	Extremes: Date	Extremes: Min.	Extremes: Date	Number of observations
0.244	−2.5	991.3	79						91	3	−8.0	697	53	0.36	16.2	July 21, 1934	−25.3	Feb. 27, 1935	88
½	−2.7	959.9	78	0.08					91	4	−12.4	611	50	.44	10.2	Sept. 9, 1934	−30.0	Jan. 31, 1936	81
1	−3.1	901	74	.08	30.1	July 25, 1934	−22.0	Feb. 9, 1936	91	5	−18.1	535	48	.57	2.3	do	−33.2	Dec. 20, 1935	58
1½	−3.4	845	65	.06					89	6									
2	−4.4	793	57	.20	24.0	July 21, 1934	−21.8	Feb. 27, 1935	89	7									
2½	−6.2	743	55	.36					89										

TABLE 4.—*Data for the 16 stations mostly having only a few sounding-balloon observations*

AMARILLO, TEX.

WINTER

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Number of observations
	°C	mb	Percent	°C/100m	
1.117	−0.6	890.8	40	----------	3
½	----------	----------	----------	----------	----------
1	----------	----------	----------	----------	----------
1½	.5	848.6	49	+0.29	3
2	3.4	798	41	+.58	3
2½	2.9	748	37	.10	3
3	.3	704	37	.52	3
4	−7.0	620	43	.73	3
5	−15.3	545	45	.83	3
6	−23.1	476	35	.78	3
7	−30.9	414	32	.78	3
8	−37.4	359	30	.65	3
9	−45.1	310	31	.77	3
10	−53.5	265	31	.84	1

BLUE HILL,[1] MASS. (Milton)

Altitude (km)	SPRING					SUMMER				
	Temperature	Pressure	Humidity	Lapse rate	Number of observations	Temperature	Pressure	Humidity	Lapse rate	Number of observations
	°C	mb	Percent	°C/100m		°C	mb	Percent	°C/100m	
0.195	5.6	------	72	----------	(2)	18.9	------	81	----------	(2)
½	4.3	------	67	----------	------	17.5	------	76	----------	------
1	1.7	------	70	----------	------	14.8	------	74	----------	------
1½	−.7	------	71	----------	------	11.9	------	71	----------	------
2	−2.7	------	70	----------	------	9.1	------	68	----------	------
2½	−4.6	------	70	----------	------	6.4	------	61	----------	------
3	−7.2	------	68	----------	------	3.7	------	54	----------	------
4	------	------	------	----------	------	−2.8	------	------	----------	------
5	------	------	------	----------	------	------	------	------	----------	------
6	------	------	------	----------	------	------	------	------	----------	------
7	------	------	------	----------	------	------	------	------	----------	------
8	------	------	------	----------	------	------	------	------	----------	------
9	------	------	------	----------	------	------	------	------	----------	------
10	------	------	------	----------	------	------	------	------	----------	------

Altitude (km)	AUTUMN					WINTER				
0.195	9.2	------	81	----------	(2)	−4.0	------	73	----------	(2)
½	8.1	------	78	----------	------	−5.4	------	73	----------	------
1	5.3	------	77	----------	------	−7.4	------	72	----------	------
1½	3.1	------	74	----------	------	−9.3	------	70	----------	------
2	1.5	------	69	----------	------	−10.6	------	67	----------	------
2½	−.4	------	65	----------	------	−12.4	------	65	----------	------
3	−3.3	------	68	----------	------	−14.8	------	65	----------	------
4	−8.7	------	------	----------	------	------	------	------	----------	------
5	------	------	------	----------	------	------	------	------	----------	------
6	------	------	------	----------	------	------	------	------	----------	------
7	------	------	------	----------	------	------	------	------	----------	------
8	------	------	------	----------	------	------	------	------	----------	------
9	------	------	------	----------	------	------	------	------	----------	------
10	------	------	------	----------	------	------	------	------	----------	------

[1] The data for Blue Hill are the arithmetic means of the monthly mean temperatures and humidities as given in the Harvard Annals, vol. LVIII, 1904, tables XIX and XX, p. 59.

[2] Number of observations for the entire period of 10 years, 1894–1903, is approximately 264. The number for each season at each level is not in the published data.

CINCINNATI, OHIO

WINTER

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Number of observations
	°C.	mb	Percent	°C./100m	
0.229	9.8	996.3	66	----------	3
½	8.3	964.9	70	0.55	3
1	6.1	909	74	.44	3
1½	5.3	854	59	.16	3
2	2.6	803	55	.54	3
2½	−0.2	755	51	.56	3
3	−3.0	709	48	.56	3
4	−8.1	623	45	.51	3
5	−13.9	547	49	.58	3
6	−20.0	480	43	.61	3
7	−27.1	418	40	.71	3
8	−35.4	363	42	.83	3
9	−42.5	314	43	.71	3
10	−49.1	271	43	.66	3
11	−52.7	233	42	.36	2
12	−56.8	201	42	.41	2
13	−59.8	172	42	.30	2
14	−56.2	147	42	+.36	2
15	−57.4	126	42	.12	2
16	−58.6	108	42	.12	2
17	−59.4	92	42	.08	2
18	−60.2	78	42	.08	2
19	−59.1	67	42	+.11	1
20	−57.6	57	42	+.15	1
21	−54.9	49	42	+.27	1
22	−52.0	----------	42	+.29	1

COLUMBIA, MO.

Altitude (km)	SPRING					WINTER				
	Temperature	Pressure	Humidity	Lapse rate	Number of observations	Temperature	Pressure	Humidity	Lapse rate	Number of observations
	°C.	mb	Percent	°C./100m		°C.	mb	Percent	°C./100m	
0.227	6.5	993.4	66	----------	2	−7.4	989.1	82	----------	4
½	4.7	961.0	68	0.66	2	−9.9	954.5	78	0.92	4
1	1.6	903	70	.62	2	−11.1	894	80	.24	4
1½	0.0	849	69	.32	2	−8.5	838	60	+.52	4
2	−2.0	798	67	.40	2	−10.3	786	56	.36	4
2½	−5.8	749	69	.76	2	−12.5	737	62	.44	4
3	−7.3	703	71	.30	2	−14.5	690	63	.40	4
4	−10.7	618	77	.34	2	−20.5	604	67	.60	4
5	−14.7	542	81	.40	2	−27.5	527	69	.70	4
6	−20.5	474	83	.58	2	−35.6	458	60	.81	4
7	−27.7	414	80	.72	2	−44.0	397	69	.84	3
8	−34.2	------	83	.65	1	−51.1	342	65	.71	3
9	−41.2	------	77	.70	1	−54.7	294	63	.36	3
10	−49.0	------	68	.78	1	−56.9	252	55	.22	2
11	−56.1	------	70	.71	1	−55.9	215	51	+.10	1
12	−59.1	------	71	.30	1	−55.7	185	53	+.02	1
13	−58.2	------	------	+.09	1	−56.0	159	55	.03	1
14	−57.2	------	------	+.10	1	------	------	------	----------	------
15	−56.2	------	------	+.10	1	------	------	------	----------	------

CONCORDIA, KANS.

WINTER

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Number of observations
	°C.	mb	Percent	°C./100m	
0.418	7.1	969.5	48	----------	3
½	6.8	958.4	49	0.37	3
1	3.9	899	40	.58	3
1½	11.0	843	40	+1.42	3
2	13.3	792	39	+.46	3
2½	12.3	743	40	.20	3
3	9.9	698	43	.48	3
4	1.1	614	53	.88	3
5	−5.9	538	49	.70	3
6	−12.5	470	50	.66	3
7	−19.0	408	49	.65	3
8	−25.4	354	49	.64	3
9	−27.6	308	48	.22	1
10	−29.3	267	49	.17	1
11	−31.4	232	48	.21	1
12	−31.9	201	48	.05	1
13	−31.2	174	48	+.07	1
14	−30.5	151	48	+.07	1
15	−30.1	131	48	+.04	1
16	−30.4	114	48	.08	1
17	−30.9	98	48	.05	1
18	−30.8	85	48	+.01	1

TABLE 4.—*Data for the 16 stations mostly having only a few sounding-balloon observations*—Continued

DAVENPORT, IOWA

WINTER

Altitude (km)	Tempeatvre	Pressure	Humidity	Lapse rate	Number of observations
0.178	−5.7	995.5	85	------	3
½	−7.7	955.2	90	0.62	3
1	−9.7	895	82	.40	3
1½	−11.9	840	77	.44	3
2	−13.9	787	70	.40	3
2½	−16.8	739	68	.58	3
3	−20.0	693	66	.64	3
4	−26.3	608	63	.63	3
5	−32.3	530	64	.60	3
6	−39.6	460	61	.73	3
7	−47.6	400	59	.80	3
8	−54.6	344	60	.70	2
9	−58.0	296	62	.34	2
10	−60.3	253	62	.23	2
11	−55.9	------	------	+.44	1
12	−53.2	------	------	+.27	1
13	−55.0	------	------	.18	1
14	−56.0	------	------	.10	1
15	−56.6	------	------	.06	1
16	−58.5	------	------	.19	1

DENVER, COLO.

	SPRING					WINTER [1]				
Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Number of observations	Temperature	Pressure	Humidity	Lapse rate	Number of observations
	°C.	*mb*	*Percent*	*°C./100m*		*°C.*	*mb*	*Percent*	*°C./100m*	
1.620	1.6	832.5	86	------	2	−7.5	837.3	31	------	4
½	------	------	------	------	------	------	------	------	------	------
1	------	------	------	------	------	------	------	------	------	------
1½	------	------	------	------	------	------	------	------	------	------
2	−1.2	793.0	88	0.74	2	−9.3	797.1	31	0.47	4
2½	−4.1	745	90	.58	2	−9.8	748	32	.10	4
3	−7.1	699	92	.60	2	−11.3	699	32	.30	4
4	−13.2	613	96	.61	2	−16.9	612	32	.56	4
5	−20.2	539	98	.70	2	−21.1	536	32	.42	4
6	−27.4	471	100	.72	2	−27.2	468	31	.61	4
7	−34.0	409	100	.66	2	−33.9	406	30	.67	4
8	−41.1	355	97	.71	2	−41.2	352	32	.73	4
9	−48.1	307	97	.70	2	−46.7	304	------	.55	3
10	−53.1	265	97	.50	2	−48.0	262	------	.13	2
11	−55.7	229	96	26	2	−43.9	226	------	+.41	1
12	−56.3	199	96	.06	2	------	------	------	------	------
13	−55.6	172	95	+.07	2	------	------	------	------	------
14	−54.8	148	95	+.08	2	------	------	------	------	------
15	−54.8	126	94	.00	2	------	------	------	------	------
16	−54.5	108	91	+.03	1	------	------	------	------	------
17	−54.3	94	89	+.02	1	------	------	------	------	------

[1] Only 1 observation for humidity.

INDIANAPOLIS, IND.

AUTUMN

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Number of observations
	°C.	*mb*	*Percent*	*°C./100m*	
0.212	18.6	998	59	------	6
½	15.8	962	63	0.97	6
1	11.7	907	69	.82	6
1½	8.5	------	73	.64	6
2	5.3	803	66	.64	6
2½	4.0	------	52	.26	6
3	2.6	710	38	.28	6
4	−4.2	627	32	.68	6
5	−10.5	552	31	.63	6
6	−18.7	484	28	.82	6
7	−26.2	426	28	.75	5
8	−34.2	371	28	.80	5
9	−41.3	322	28	.71	5
10	−47.8	278	28	.65	5
11	−51.7	239	28	.39	5
12	−54.5	204	28	.28	4
13	−56.1	175	28	.16	4
14	−55.4	149	28	+.07	4
15	−54.9	124	28	+.05	2
16	−54.9	106	28	.00	2
17	−54.8	90	28	+.01	2
18	−52.8	76	28	+.20	2
19	−49.5	64	28	+.33	1

LITTLE ROCK, ARK.

WINTER

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Number of observations
0.127	11.1	1,004.2	75	------	3
½	11.1	961.6	80	0.00	3
1	9.8	906	80	.26	3
1½	7.9	852	79	.38	3
2	5.5	802	78	.48	3
2½	2.8	755	76	.54	3
3	0.4	708	74	.48	3
4	−5.8	623	66	.62	3
5	−12.6	549	61	.68	3
6	−17.3	482	48	.47	3
7	−22.8	421	49	.55	3
8	−29.6	365	49	.68	2
9	−36.6	316	47	.70	2
10	−43.4	273	45	.68	2
11	−48.8	235	45	.54	2
12	−51.8	201	45	.30	2
13	−52.8	172	44	.10	2
14	−53.8	148	44	.10	2
15	−55.5	127	44	.17	2
16	−57.5	109	44	.20	2
17	−57.8	94	44	.03	1
18	−56.1	80	44	+.17	1
19	−54.3	69	44	+.18	1
20	−50.8	59	44	+.35	1
21	−46.3	51	44	+.45	1

LOS ANGELES, CALIF.

	SPRING					WINTER				
Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Number of observations	Temperature	Pressure	Humidity	Lapse rate	Number of observations
	°C.	*mb*	*Percent*	*°C./100m*		*°C.*	*mb*	*Percent*	*°C./100m*	
0.127	17.3	1,002.0	------	------	1	6.0	1,010.5	39	------	1
½	16.0	959.0	------	0.35	1	7.7	965.3	36	+0.46	1
1	14.0	904	------	.40	1	5.5	908	32	.44	1
1½	11.4	852	------	.52	1	2.8	854	31	.54	1
2	10.1	802	------	.26	1	0.0	804	31	.56	1
2½	7.5	756	------	.52	1	−3.0	754	31	.60	1
3	5.0	711	------	.50	1	−4.7	708	31	.34	1
4	−2.0	628	------	.70	1	−9.4	623	30	.47	1
5	−9.3	553	------	.73	1	−16.9	547	30	.75	1
6	−16.7	485	------	.74	1	−25.6	478	------	.87	1
7	−24.7	425	------	.80	1	−35.6	415	------	1.00	1
8	−32.3	370	------	.76	1	−39.9	360	------	.43	1
9	------	------	------	------	------	−48.7	311	------	.88	1
10	------	------	------	------	------	−55.6	267	------	.69	1

MOUNT WEATHER, VA.[1]

	SPRING					SUMMER				
Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Number of observations	Temperature	Pressure	Humidity	Lapse rate	Number of observations
	°C.	*mb*	*Percent*	*°C./100m*		*°C.*	*mb*	*Percent*	*°C./100m*	
0.526	10.7	954.9	68	------	423	21.4	955.6	71	------	425
½	------	------	------	------	------	------	------	------	------	------
1	7.8	902.0	68	0.61	408	18.2	904.6	68	0.68	417
1½	5.2	848	64	.52	370	15.1	853	64	.62	369
2	2.5	799	59	.54	320	12.1	804	58	.60	290
2½	−0.1	751	52	.52	255	9.3	757	49	.56	181
3	−2.8	705	49	.54	189	6.3	713	43	.60	124
4	−8.8	621	------	.60	87	−0.1	632	------	.64	58
5	−15.5	545	------	.67	19	−6.5	556	------	.64	15
6	−22.1	477	------	.66	3	−13.6	496	------	.71	2
7	−28.3	------	------	.62	2	−19.4	------	------	.58	1

[1] Values are the arithmetic means of pressure and humidity for each standard level; the temperatures were computed by the method of differences.

TABLE 4.—*Data for the 16 stations mostly having only a few sounding-balloon observations*—Continued

MOUNT WEATHER, VA.—Continued

Altitude (km)	AUTUMN Temperature	Pressure	Humidity	Lapse rate	Number of observations	WINTER Temperature	Pressure	Humidity	Lapse rate	Number of observations
	°C.	mb	Percent	°C./100m		°C.	mb	Percent	°C./100m	
0.526	12.0	956.5	72	----	426	−0.8	954.6	67	----	408
½	----	----	----	----	----	----	----	----	----	----
1	9.4	903.7	71	0.55	418	−2.1	899.4	66	0.27	395
1½	7.2	852	67	.44	372	−3.0	845	63	.18	356
2	5.4	800	59	.36	307	−4.2	792	63	.24	289
2½	3.3	753	61	.42	220	−6.0	744	57	.36	222
3	0.7	708	63	.52	158	−8.4	699	54	.48	160
4	−5.2	627	----	.59	71	−14.0	616	----	.56	51
5	−11.4	549	----	.62	22	−19.8	531	----	.58	9
6	−17.2	492	----	.58	5	----	----	----	----	----
7	−27.5	----	----	1.03	1	----	----	----	----	----

NEW ORLEANS, LA.

WINTER

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Number of observations
	°C.	mb	Percent	°C./100m	
0.017	12.8	1,010.9	86	----	4
½	10.4	954.1	85	0.50	4
1	11.6	899	73	+.24	4
1½	9.7	847	69	0.38	4
2	7.8	797	61	.38	4
2½	6.0	750	49	.36	4
3	3.4	705	45	.52	4
4	−3.1	622	37	.65	4
5	−9.2	548	29	.61	4
6	−15.9	481	25	.67	3
7	−21.9	421	20	.60	3
8	−30.6	367	24	.87	2
9	−36.9	318	26	.63	1
10	−44.8	276	27	.79	1
11	−51.7	238	27	.69	1
12	−57.9	203	27	.62	1

PITTSFIELD, MASS.

Altitude (km)	SPRING Temperature	Pressure	Humidity	Lapse rate	Number of observations	SUMMER Temperature	Pressure	Humidity	Lapse rate	Number of observations
	°C.	mb	Percent	°C./100m		°C.	mb	Percent	°C./100m	
0.300	5.8	----	----	----	2	25.5	----	----	----	1
½	4.2	----	----	0.80	2	----	----	----	----	----
1	3.0	----	----	.24	2	----	----	----	----	----
1½	4.8	----	----	+.36	2	18.3	----	----	0.60	1
2	5.2	----	----	+.08	2	14.7	----	----	.72	1
2½	4.2	----	----	.20	2	10.3	----	----	.88	1
3	2.3	----	----	.38	2	7.1	----	----	.64	1
4	−1.1	----	----	.34	2	1.5	----	----	.56	1
5	−6.1	----	----	.50	2	−.9	----	----	.24	1
6	−11.6	----	----	.55	1	−6.5	----	----	.56	1
7	−17.1	----	----	.55	1	−12.9	----	----	.64	1
8	−23.1	----	----	.60	1	−19.3	----	----	.64	1
9	−29.1	----	----	.60	1	−24.8	----	----	.55	1
10	−35.3	----	----	.62	1	----	----	----	----	----
11	−43.3	----	----	.80	1	----	----	----	----	----
12	−52.7	----	----	.94	1	----	----	----	----	----

ROSWELL, N. MEX.

Altitude (km)	SPRING Temperature	Pressure	Humidity	Lapse rate	Number of observations	WINTER Temperature	Pressure	Humidity	Lapse rate	Number of observations
	°C.	mb	Percent	°C./100m		°C.	mb	Percent	°C./100m	
1.098	12.0	881.2	60	----	2	0.6	894.1	82	----	2
½	----	----	----	----	----	----	----	----	----	----
1	----	----	----	----	----	----	----	----	----	----
1½	9.8	839.8	60	0.55	2	−1.9	849.9	84	0.62	2
2	5.6	791	61	.84	2	−2.5	798	80	.12	2
2½	1.0	743	65	.92	2	−5.9	748	76	.68	2
3	−2.8	698	69	.76	2	−8.5	702	71	.52	2
4	−9.8	614	67	.70	2	−13.6	617	67	.51	2
5	−18.4	538	67	.86	2	−18.4	541	64	.48	2
6	−26.8	468	67	.84	2	−24.7	471	63	.63	1
7	−36.4	406	65	.96	2	−32.2	410	62	.75	1
8	−41.0	352	61	.46	2	−40.4	355	62	.82	1
9	−44.2	304	56	.32	2	−48.8	306	62	.84	1
10	−45.5	262	56	.13	2	−55.3	262	58	.65	1
11	−47.1	226	57	.16	2	−59.8	224	58	.45	1
12	−48.7	194	57	.16	2	−61.8	191	57	.20	1
13	−50.9	166	57	.22	2	−65.1	163	57	.33	1
14	−54.0	143	57	.31	1	−69.5	139	57	.44	1
15	−57.1	122	57	.31	1	−73.2	118	57	.37	1
16	−57.3	104	57	.02	1	----	----	----	----	----
17	−59.5	88	57	.22	1	----	----	----	----	----
18	−60.4	76	59	.09	1	----	----	----	----	----
19	−60.7	65	61	.03	1	----	----	----	----	----
20	−60.9	55	63	.02	1	----	----	----	----	----

SIOUX CITY, IOWA

WINTER

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Number of observations
	° C.	mb	Percent	°C./100m	
0.361	−6.9	979.9	57	----	3
½	−7.6	962.6	56	0.50	3
1	−10.7	903	57	.62	3
1½	−9.3	845	59	+.28	3
2	−9.0	793	59	+.06	3
2½	−10.6	741	58	.32	3
3	−12.8	694	58	.44	3
4	−17.8	607	59	.50	3
5	−24.3	532	59	.65	3
6	−32.2	463	61	.79	3
7	−39.6	401	60	.74	3
8	−47.2	346	58	.76	3
9	−54.6	296	56	.74	2
10	−60.0	254	55	.54	2
11	−59.4	217	55	+.06	2
12	−58.6	185	54	+.08	1
13	−58.8	157	54	.02	1
14	−59.4	133	54	.06	1
15	−59.8	113	54	.04	1
16	−60.1	97	54	.03	1
17	−60.1	82	54	.00	1
18	−60.0	70	54	+.01	1
19	−60.6	60	53	.06	1

VICKSBURG, MISS.

WINTER

Altitude (km)	Temperature	Pressure	Humidity	Lapse rate	Number of observations
0.092	9.3	1008.0	82	----	5
½	6.8	958.5	84	0.61	5
1	4.7	902	83	.42	5
1½	5.8	848	75	+.22	5
2	4.3	797	66	.30	5
2½	2.1	749	57	.44	5
3	−0.7	704	49	.56	5
4	−5.2	621	46	.45	5
5	−11.6	547	36	.64	5
6	−18.2	480	33	.66	5
7	−23.6	420	33	.54	4
8	−31.3	366	31	.77	4
9	−42.3	324	31	1.10	4
10	−51.0	273	31	.87	4
11	−58.0	233	31	.70	2
12	−62.3	199	31	.43	2
13	−61.9	169	31	+.04	2
14	−61.5	143	31	+.04	2
15	−61.3	123	31	+.02	2
16	−60.5	105	33	+.08	2
17	−59.2	89	36	+.13	2

TABLE 5.—*Theoretical minimum pressures*

	For surface temperature of −12.2° C. or 10° F.		For surface temperature of 10° C. or 50° F.			For surface temperature of −12.2° C. or 10° F.		For surface temperature of 10° C. ot 50° F.	
	mb	Inches	mb	Inches		mb	Inches	mb	Inches
Sea level	982.1	29.00	914.3	27.00	5	477	14.09	474	14.00
½	923	27.26	860	25.40	6	406	11.99	409	12.08
1	862	25.45	813	24.01	7	342	10.10	348	10.28
1½	803	23.71	764	22.56	8	285	8.42	298	8.80
2	746	22.03	717	21.17	9	236	6.97	250	7.38
2½	691	20.41	673	19.87	10	196	5.79	210	6.20
3	645	19.05	627	18.52	11	162	4.78	174	5.14
4	555	16.39	546	16.12	12	134	3.96	143	4.22

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